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AccessLevel	Public
Division	Waste Management
Section	Superfund
Program	IHS (IHS)
DocCat	Facility

NCDENR
North Carolina Department of Environment and Natural Resources
Division of Waste Management
Dexter R. Matthews
Director

Beverly Eaves Perdue
Governor

Dee Freeman
Secretary

October 7, 2010

Mr. Charlie Horne
County Manager
PO Box 1809
Pittsboro, NC 27312

Subject: Pre-Regulatory Landfill Sites in Chatham County

Dear Mr. Horne:

The General Assembly of North Carolina enacted Senate Bill 1492 which created a program to assess the public health and environmental hazards at landfill and dump sites that operated prior to 1983 and to develop and implement remedial action plans at sites requiring remediation. The Pre-Regulatory Landfill Unit (Unit) was created in the Inactive Hazardous Sites Branch (IHSB) to oversee these activities. The purpose of this letter is to make you aware of the sites identified in your county and to provide general guidance of relevant state statutes.

Based on the information obtained by the Unit, the sites listed below tentatively qualify under Senate Bill 1492.

ID Number	*Site Name*	*Site Address*
NONCD0000224	Bynum Dump	SR 1522, Bynum
NONCD0000227	Goldston Dump	SR 2137, Goldston
NONCD0000226	Bonlee Dump	SR 2126, Bonlee
NONCD0000225	Siler City Dump	SR 1313, Siler City

Work at these sites may be performed using the Unit's resources or through local government actions. The Unit has prioritized the sites statewide based on their threat to public health and the environment and will perform assessments and implement remedial actions based on this priority. Local governments may opt to perform the work at any time under the guidance of the Unit. Reimbursement of local government costs may be available for assessments and remedial actions to abate an imminent hazard as funds are available. The conditions for reimbursement include approval of the assessment and remediation plan by the Unit and certified accounting of costs. A document, IHSB *Guidelines for Addressing Old Landfills & Dumps*, was developed to assist local governments and the Unit in this work. It is available on our web site, http://portal.ncdenr.org/web/wm/sf/ihs/ihsoldlf, for your review.

An additional purpose in notifying you of these sites is to provide information to assist in your responsibilities in the permitting of private drinking water wells. The General Assembly enacted legislation which required local health departments to implement programs for the permitting, inspecting, and testing of private drinking water wells by July 1, 2008. State well construction standards in 15A NCAC 2C require a minimum horizontal separation of 500 feet between a water supply well and a landfill or disposal site. More precise location information for the sites in your county may be requested from the Unit.

If you are aware of additional sites, have additional information on the identified sites, or need further information, please email me at analee.thornburg@ncdenr.gov or you can call Bruce Lefler at (919) 508-8463

Sincerely,

Analee Thornburg

Analee Thornburg
Pre-Regulatory Landfill Unit
Inactive Hazardous Sites Branch
Superfund Section

cc: Ms. Holly Coleman, Health Director – PO Box 130, Pittsboro, NC 27312

NCDENR
North Carolina Department of Environment and Natural Resources
Dexter R. Matthews, Director
Division of Waste Management
Michael F. Easley, Governor
William G. Ross Jr., Secretary

February 26, 2007

<SAL> <FIRST> <LAST>, County Manager
County of <MUNICIPALITY>
<ADDRESS>
<TOWN>, North Carolina <ZIP>

Subject: Assessment, Cleanup, and Redevelopment of Old Landfill Sites Within Your Jurisdiction

Dear <SAL> <LAST>:

Governor Easley released his proposed budget February 22, 2007. Included in the budget is a specific item I believe should be of interest to you from a fiscal, environmental and public health protection perspective.

There are approximately 700 old landfills statewide and <LANDFILL#> old landfills in your local area that closed before the State permitting system became effective. These landfills are listed on the Old Landfill Sites portion of the Inactive Hazardous Sites Inventory maintained by the Superfund Section, Division of Waste Management. Any person, including local governments, that arranged for disposal or disposed of waste in the landfills may be held liable for the cleanup of the site. I have attached a report that identifies the location of known old landfill sites in <COUNTY NAME> County that may have closed prior to 1983 and thus qualify for the program described in this letter.

The Division has surveyed old landfills in 47 counties. The results of the survey indicate reason for concern about potential public health and safety impacts of these sites if they are not addressed. Seventy percent of the sites surveyed had a school, church, residence, day care or drinking water source within 1000 feet. The Division has found 102 old landfills that have a drinking water well within 500 feet. Thirteen of the landfills surveyed have residences built over the old landfill. The cost of assessment and cleanup of these old landfill sites can be as high as several million dollars.

Governor Easley's budget establishes a partnership between the State and local governments to both clean up the old landfill sites and provide funding for redevelopment of the sites. Many are in prime locations for redevelopment opportunities. The Governor's budget proposes to pay for cleanup and redevelopment of these sites through a surcharge on disposal of solid waste. The funding mechanism is a fair one. It is based on the idea that those who use solid waste disposal facilities should share responsibility for cleanup of sites used for solid waste disposal in the past that may have been lawful at the time, but did not meet standards that we now know are necessary to protect public health and safety.

The proposed $2.00 per ton disposal surcharge would apply to residential, commercial, industrial, and construction and demolition debris type waste that is either disposed at a landfill or passes through a transfer station for disposal out-of-state. The State would use revenue from the surcharge to contract for cleanup of the old landfill sites and to provide grants to local government for redevelopment. The funds could also be used across the state to clean up other hazardous substance disposal sites that have no viable responsible party.

The only tool currently available to the State to ensure cleanup when it is needed is an enforcement action against those who owned, operated, or contributed to old landfills. The Governor's proposal would avoid placing an unreasonable

burden on any one local government and allow us to use our resources for actual cleanup rather than legal action. When old landfill sites were in use, North Carolina citizens, businesses, and industries benefited from their existence as a place to dispose of waste. The surcharge on waste disposal is a way for citizens, businesses, and industries to form a partnership for cleanup and redevelopment of these old landfill sites.

There is great interest this session of the General Assembly in strengthening requirements for landfills permitted in North Carolina. I encourage you to take a close look at legislation that will be introduced, specifically this initiative and what it can bring to your jurisdiction.

If you have questions regarding the program for clean-up of old landfills, please contact Jack Butler, Chief of the Superfund Section, at jack.butler@ncmail.net or call (919)508-8450.

Sincerely,

Dexter R. Matthews, Director

cc: David Thompson, NCACC
Jack Butler, Chief – Superfund Section

NCDENR

North Carolina Department of Environment and Natural Resources

Dexter R. Matthews, Director | Division of Waste Management | Michael F. Easley, Governor
William G. Ross Jr., Secretary

February 27, 2007

<SAL> <FIRST> <LAST>
<TITLE>, <MUNICIPALITY>
<ADDRESS>
<TOWN>, North Carolina <ZIP>

Subject: Assessment, Cleanup, and Redevelopment of Old Landfill Sites Within Your Jurisdiction

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If you have questions regarding the program for clean-up of old landfills, please contact Jack Butler, Chief of the Superfund Section at jack.butler@ncmail.net or (919) 508-8450.

Sincerely,

Dexter R. Matthews, Director

cc: Ellis Hankins, NCLM
Jack Butler, Chief – Superfund Section

NCDENR

North Carolina Department of Environment and Natural Resources

Dexter R. Matthews, Director | Division of Waste Management | Michael F. Easley, Governor
William G. Ross Jr., Secretary

January 31, 2005

Mr. Charlie Horne
County Manager
PO Box 87
Pittsboro, North Carolina 27312

Re: Request for Information on old unlined landfills, Chatham County.

Dear Mr. Horne,

The Division of Waste Management, Superfund Section, Inactive Hazardous Sites Branch (Branch) is in the process of cataloging old landfills in the state. This letter is being sent to you to solicit your cooperation in providing information on old unlined landfills that are not subject to Division of Waste Management, Solid Waste Section post-closure regulations in your county. This process is a part of a statewide effort to accurately inventory old dumpsites to aid in safe reuse and to protect public health and the environment.

Once an old landfill site has been identified, the site location, site usage, and vicinity usage is researched. Potential hazards to the public and the environment are then evaluated by risk assessment. Sites then are reviewed based on risk and/or by safe redevelopment requests.

The Branch then works with owners and responsible parties on final solutions for containment of the waste and to ensure safe reuse of the old landfill sites. Safe reuse might involve engineering controls to prevent exposure to wastes, if necessary, and restrictive covenants limiting the property to certain uses and setting conditions for construction or other soil disturbing activities. Annual reporting that restrictive covenants remain in place will be a duty of the current owner.

Known old landfills/dump sites are maintained in a database. Attached is a listing of known sites located in your county. Available information that may include location and years of operation information for each site is also listed. Please review the list and verify or provide information that will more accurately characterize the site(s). If you have knowledge of sites not included on the list, please add the additional sites along with location information, directions, years of operation, and any additional notable information.

1646 Mail Service Center, Raleigh, North Carolina 27699-1646
Phone 919-733-4996 \ FAX 919-715-3605 \ Internet http://wastenotnc.org
An Equal Opportunity / Affirmative Action Employer – Printed on Dual Purpose Recycled Paper

Please return the list and any additional information within 90 days to:

Cheryl Marks
Inactive Hazardous Sites Branch
Superfund Section
NC Division of Waste Management
401 Oberlin Road - Suite 150
Raleigh, NC 27605-1350

Or you may email me with your response at Cheryl.Marks@ncmail.net or call with any questions concerning this request at (919) 733-2801, extension 283. Thank you for your cooperation.

Sincerely,

Cheryl Marks

Cheryl Marks, Hydrogeologist
Inactive Hazardous Site Branch
NC Superfund Section

Old Landfill Inventory - Location Information

Latitude/Longitude and other data in this report is highly subject to inaccuracies. State Plane coordinates replace latitude/longitude entries as data is collected. These coordinates may also be subject to error.

COUNTY: CHATHAM

Site Name:	BONLEE DUMP	**In IHS Inventory?**	No
ID Number:	NONCD0000226	**Other Agency Lead**	
Site Address:	SR 2126	**NFA or NFA-Restricted Use?**	No
City:	BONELEE	**Unable to Locate**	○
State Plane X:		**Latitude:**	35.6432
State Plane Y:		**Longitude:**	-79.3864

Directions: 1 MI (E OR W) OF US 421 ON SR 2126

LDFL Size (Acres):		**Present Within 1000 ft of Ldfl**			
Property Size (Acres):		**Church**	No	**Residence On Ldfl?**	No
Date Open:		**School**	No	**Potable Well Within 500 ft?**	No
Date Closed:	1973	**Day Care**	No	**Adjoins Perennial SW?**	No
		Residential	No		

Notes:

(End Site Record)

Site Name:	**BYNUM DUMP**	**In IHS Inventory?**	No
ID Number:	NONCD0000224	**Other Agency Lead**	
Site Address:		**NFA or NFA-Restricted Use?**	No
City:	BYNUM	**Unable to Locate**	○
State Plane X:		**Latitude:**	35.7734
State Plane Y:		**Longitude:**	-79.1617

Directions: N OF SR 1520, 1.5 MI W OF HWY 15-501

LDFL Size (Acres):		**Present Within 1000 ft of Ldfl**			
Property Size (Acres):		**Church**	No	**Residence On Ldfl?**	No
Date Open:		**School**	No	**Potable Well Within 500 ft?**	No
Date Closed:	1973	**Day Care**	No	**Adjoins Perennial SW?**	No
		Residential	No		

Notes:

(End Site Record)

Site Name:	CHATHAM CO LDFL	**In IHS Inventory?**	Yes
ID Number:	NCD980502868	**Other Agency Lead**	SWS
Site Address:	SR 1578	**NFA or NFA-Restricted Use?**	No
City:	PITTSBORO	**Unable to Locate**	○
State Plane X:		**Latitude:**	
State Plane Y:		**Longitude:**	

Directions: SR 1578

LDFL Size (Acres):		**Present Within 1000 ft of Ldfl**			
Property Size (Acres):		**Church**	No	**Residence On Ldfl?**	No
Date Open:		**School**	No	**Potable Well Within 500 ft?**	No
Date Closed:	1993	**Day Care**	No	**Adjoins Perennial SW?**	No
		Residential	No		

Notes: CO MANAGER INDICATES ON SR 1578, NOT 1513.

(End Site Record)

Site Name:	**GOLDSTON DUMP**	**In IHS Inventory?**	No
ID Number:	NONCD0000227	**Other Agency Lead**	
Site Address:	SR 2137	**NFA or NFA-Restricted Use?**	No
City:	GOLDSTON	**Unable to Locate**	○
State Plane X:		**Latitude:**	35.5935
State Plane Y:		**Longitude:**	-79.2875

Directions: 3 MI E OF TOWN ON SR 2137

LDFL Size (Acres):		**Present Within 1000 ft of Ldfl**			
Property Size (Acres):		**Church**	No	**Residence On Ldfl?**	No
Date Open:		**School**	No	**Potable Well Within 500 ft?**	No
Date Closed:	1973	**Day Care**	No	**Adjoins Perennial SW?**	No
		Residential	No		

Notes:

(End Site Record)

Site Name:	**SILER CITY DUMP**	**In IHS Inventory?**	No
ID Number:	NONCD0000225	**Other Agency Lead**	
Site Address:	SR 1313	**NFA or NFA-Restricted Use?**	No
City:	SILER CITY	**Unable to Locate**	○
State Plane X:		**Latitude:**	35.7658
State Plane Y:		**Longitude:**	-79.4509

Directions: 2 MI N OF TOWN ON SR 1313

LDFL Size (Acres):	**Present Within 1000 ft of Ldfl**				
Property Size (Acres):	**Church**	No	**Residence On Ldfl?**	No	
Date Open:	**School**	No	**Potable Well Within 500 ft?**	No	
Date Closed:	**Day Care**	No	**Adjoins Perennial SW?**	No	
	Residential	No			

Notes:

(End Site Record)

Number of Sites: 5 (End County Record)

MEMORANDUM

April 27, 1999 Rauhed

To: Charlotte Jesneck, Head
Inactive Hazardous Sites Branch
Superfund Section

From: Greg Herr
Inactive Hazardous Sites Branch
Superfund Section

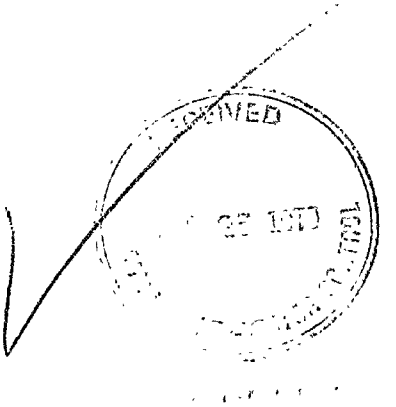
RE: Landfill
Reichhold Chemical, Inc.
Moncure/Chatham
NCD 049 845 548

The Reichhold Chemical, Inc. site is an active manufacturing plant. Wastes from the facility consist primarily of gelled phenolic formaldehyde, urea formaldehyde resins and drying bed solids. These wastes have been stored in an on-site surge pond and in two on-site landfills since its start-up in 1970. One of the two landfills is closed and filled over. Analysis of samples taken from a 1991 Site Inspection show that there have been no releases of hazardous waste from the closed landfill to groundwater or to downgradient surface water bodies.

- Chatham

North Carolina Department of Natural Resources & Community Development
James B. Hunt, Jr., Governor
Howard N. Lee, Secretary

October 23, 1979



Mr. O. W. Strickland
Office of Solid Waste and Vector Control
Division of Health Services
306 Bath Building
Raleigh, North Carolina

Dear Mr. Strickland:

I would like to take this opportunity to thank you for your continued interest and concern for the citizens of North Carolina as exhibited through your fine assistance in helping the Town of Siler City with its commercial solid waste situation.

As you are aware, there were several alternatives and many options available for the Town to decide upon in improving their system. The Manager, my supervisor, (Mr. John Berndt, CD Administrator) and myself have discussed these alternatives at great length. The Town Board has also discussed the alternatives with the Manager. The last request I received from Jim was for me to put together a final assessment based on the Town's needs and concerns.

After reviewing the initial Solid Waste Study of Siler City, I see the need for some additional reorganization and a narrowing of the focus of the report. Please use the report only as a reference tool for Siler City. When time permits, I shall reorganize it.

I appreciate your time and efforts towards helping our agency provide technical assistance to Siler City. If I can be of help to you or your agency, feel free to call any time (733-2314).

Sincerely,

Leonard Holden

Leonard Holden
Community Development Specialist

LH:tja

cc: Mr. John Berndt

TOWN OF SILER CITY

CHATHAM COUNTY, NORTH CAROLINA

"ALTERNATIVES FOR COMMERCIAL SOLID WASTE COLLECTION"

This is an assessment of several alternatives available to the town regarding the collection of commercial solid waste.

The noncommercial functions of the existing system were also analyzed and generally found to be adequate based on the current needs of the town.

This assessment is the result of a request for technical assistance made to the Division of Community Assistance, from the town manager, Mr. Jim Hipp.

Technical Assistance Provided By:

Leonard E. Holden, Community Development Specialist
October 1979

North Carolina Department of Natural Resources and Community Development

Howard N. Lee, Secretary

Division of Community Assistance

Lenwood V. Long, Director

Raleigh Regional Office

John A. Berndt, Administrator

ALTERNATIVES FOR COMMERCIAL SOLID WASTE COLLECTION

TOWN OF SILER CITY, NORTH CAROLINA

ALTERNATIVES	OPTIONS	ADVANTAGES	DISADVANTAGES	RELATED COSTS
1. Town provides the commercial collection Retains the existing curbside residential, trash and leaf collection system	a. purchase the standardized rear loading containers and the necessary winch devices for the CBD and the other (large volume) businesses in town e.g. the winch can be attached to the older garbage truck to be used for commercial collection only - thus delaying the purchase of a new truck	-eliminate the existing unsanitary storage system in parts of the CBD and at some other large volume businesses served by the town -create a mechanized, sanitary, time saving method for collecting commercial garbage -create a fixed schedule (eliminate the six-day a week pickup) which will control operating costs and collection time -eliminate one crew; save money -save on fuel use from reduced pickups	-a large initial outlay for purchasing the containers and the devices -the town must provide maintenance for the containers and the necessary devices -eliminate one crew, meaning, some type movement of employees -if the town decides to continue providing commercial service, a new truck will be needed eventually	-the costs for the necessary containers and the devices needed to implement a rear loading standardized container system -possibly the town will save on rising fuel costs if the town moves to a standardized system on a fixed schedule -eliminating one crew from the payroll would save considerable amount if the current operating budget is maintained somewhat
	b. delay the purchase of a new garbage truck and purchase a new or good used truck body for the old rear packer; and also purchase the necessary containers for the CBD and other (large volume) businesses; and the winch device	-delay the purchase of a new garbage truck -a rebuilt rear packer garbage truck with a winch device attached for loading standardized containers should be able to provide the commercial garbage collection adequately		-consider the cost of a new garbage truck compared to purchasing a new or used truck and devices for the old packer assembly to be used a while longer

ALTERNATIVES	OPTIONS	ADVANTAGES	DISADVANTAGES	RELATED COSTS
1. Town provides the commercial collection Retains the existing curbside residential, trash and leaf collection system (continued from page 1)	c. ask the CBD merchants and other (large volume) merchants serviced by the town to jointly provide the necessary container(s) on an agreement basis from the town e.g., share basis leased basis rental basis purchase basis (short term or long term)	-the town could possibly purchase a new garbage truck and devices needed to adequately provide a standardized commercial system for its business		

ALTERNATIVES	OPTIONS	ADVANTAGES	DISADVANTAGES	RELATED COSTS
2-A. Town provides the commercial collection Town retains the existing residential trash and leaf system	a. the Town of Siler City could lease or purchase the necessary front-end loading containers and place them in designated places at a user fee (e.g., lease agreement)	-eliminate the existing system -the merchants must pay a user fee (e.g. 80% of the collection cost) to help pay for the cost of operating a clean contract service -eliminate one three-man crew -delay the purchase of a new garbage truck	-a large initial capital outlay for purchasing the necessary front-end loading containers -loss of jobs -the town would have to deal with the expected increase in service cost associated with a contractor	-a monthly user fee must be billed and collected -the town must lease or purchase the containers initially -elimination of one crew and fringe benefits will save the town money
	b. the Town of Siler City could ask that the CBD merchants and other (large volume) businesses lease or purchase the necessary front-end loading containers and the town would pay for the service from the budget	-save on fuel use -one crew could handle the municipally operated residential system in a 40-hour work week (also retain the task incentive system)	-the merchants may be reluctant to agree to a lease/purchase agreement	-the cost for the necessary containers
	c. the Town of Siler City could lease or purchase the containers and also pay for the monthly service charge from the budget	-eliminate involving the merchant with a garbage decision	-as businesses increased in the town, so would garbage collection costs increase due to the extra containers needed	-the cost of the containers initially and the monthly service charge must be provided by the town
	d. the contractor would provide the containers and the collection service for a monthly fee to the town			-the town would have a monthly garbage collection fee

ALTERNATIVES	OPTIONS	ADVANTAGES	DISADVANTAGES	RELATED COSTS
2-B. Contractor provides the commercial collection Town retains the existing residential, trash and leaf system	a. the CBD merchants and other (large volume) businesses would deal directly with the contractor e.g. lease/purchase rental share basis b. large apartment complexes, clubs, churches, schools, public buildings, and all others would deal with the contractor for service	-the town would not be involved in the commercial garbage area except to provide assistance and enforcement of the ordinance	-merchants may be reluctant to agree to this arrangement (e.g. this arrangement is working well in Garner, N. C.)	-cost of the service

Note: Certain advantages or disadvantages apply uniformly to all the alternatives and options listed. It is understood that there exist many more advantages or disadvantages which are not mentioned here. Listed are those readily apparent.

South Carolina
Department of
Health and
Environmental
Control

— Chatham

BOARD
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George G. Graham, D.D.S.
Michael W. Mims
Barbara P. Nuessle

Malcolm U. Dantzler, M.D.
COMMISSIONER
2600 Bull Street
Columbia, S.C. 29201

September 19, 1979

RECEIVED
SEP 24 1979
SOLID WASTE-VECTOR CONTROL

Mr. R.K. Smith
Allied Chemical Corporation
Moncure Plant
P.O. Box 166
Moncure, North Carolina 27559

IN RE: Disposal of Residual Antimony at S.C.SCA Chemical Services, Inc., in Pinewood, South Carolina -- Sumter County

Dear Mr. Smith:

This office hereby grants approval for disposal of the above referenced waste at the referenced site. Approval is for 450 gallons per month of residual antimony compound and packing materials.

Transport of this material must be in such a manner to prevent spillage or leakage and must comply with all State Public Service Commission and Department of Transportation regulations. It is the responsibility of Allied Chemical Corp. and the hauler of the waste to ensure that adequate transportation vehicles are used.

The enclosed Manifest Form is to be used in conjunction with the disposal of this waste. Allied Chemical Corp. - Moncure Plant must fill out completely the appropriate portion of the form and return the pink copy to this office upon shipment of the waste. The yellow and white copies shall be sent with the waste when transported to the disposal facility with the remainder of the form completed by indicated parties. The disposal facility shall verify the accuracy of the Manifest and return the yellow copy to this office. This Division retains the right to sample any waste going to this site to ensure compliance with the Manifest.

Any changes in composition or volume of this waste, or if any problems are encountered during disposal, this authorization will be nullified. Disposal of this waste at other than the requested facility will require prior written approval from this office.

Sincerely,

Earl Williams

Earl M. Williams, Jr., P.E., Manager
Industrial Waste Section
Solid Waste Management Division

/kk

cc: O.W. Strickland
W.E. Stilwell
Capers Dixon

Enclosure

BOARD
William M. Wilson, Chairman
William C. Moore, Jr., D.M.D., Vice-Chairman
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George G. Graham, D.D.S.
J. Lorin Mason, Jr., M.D.
C. Maurice Patterson

SOUTH CAROLINA DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL

Albert G. Randall, M.D., M.P.H.
Commissioner

Sims-Aycock Buildings
2600 Bull Street, Columbia, SC 29201

May 16, 1979

Mr. R. K. Smith
Allied Chemical Corp.
P.O. Box 166
Moncure, NC 27559

IN RE: Polyester resin waste into SCSCA Services, Inc.
IWP-145 -- Sumter County

Dear Mr. Smith:

This office hereby grants approval for disposal of the above referenced waste at South Carolina SCA Services, Inc., near Pinewood, S.C. Approval if for approximately 2,400 pounds of N-(2, 3 epoxypropyl) - phthalimide and 3,000 lbs. of potassium phthalimide as described.

Transport of this material must be in such a manner to prevent spillage or leakage and must comply with all State Public Service Commission and Department of Transportation regulations. It is the responsibility of Allied Chemical Corp. and the hauler of the waste to ensure that adequate transportation vehicles are used.

The enclosed Manifest Form is to be used in conjunction with the disposal of this waste. Allied Chemical Corp. must fill out completely the appropriate portion of the form and return the pink copy to this office upon shipment of the waste. The yellow and white copies shall be sent with the waste when transported to the disposal facility with the remainder of the form completed by indicated parties. The disposal facility shall verify the accuracy of the Manifest and return the yellow copy to this office. This Division retains the right to sample any waste going to this site to ensure compliance with the Manifest.

Any changes in composition or volume of this waste, or if any problems are encountered during disposal, this authorization will be nullified. Disposal of this waste at other than the requested facility will require prior written approval from this office.

Sincerely,

Earl Williams

Earl M. Williams, Jr., P.E., Manager
Industrial Waste Section
Solid Waste Management Division

/kk

cc: W. E. Stilwell
Capers Dixon
Jerry Perkins

Enclosure

BOARD
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George G. Graham, D.D.S.
J. Lorin Mason, Jr., M.D.
C. Maurice Patterson

SOUTH CAROLINA DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL

Albert G. Randall, M.D., M.P.H.
Commissioner

Sims-Aycock Buildings
2600 Bull Street, Columbia, SC 29201

RECEIVED
MAR 2 1979
SOLID WASTE-VECTOR CONTROL

February 22, 1979

Mr. J. G. Neal
Allied Chemical Corp.
P.O. Box 166
Moncure, NC 27559

IN RE: Disposal of Spent Glycol Bottoms at South Carolina Services Landfill
IWP #145 -- Sumter County

Dear Mr. Neal:

This office hereby grants approval for the above referenced waste to be disposed at South Carolina SCA Services Landfill near Pinewood, S.C. This approval is as requested by Mr. Stilwell's letter of February 6, 1979. This approval is for 100,000 pounds per month of spent glycol waste from Moncure, N.C.

Transport of this material must be in such a manner to prevent spillage or leakage and must comply with all State Public Service Commission and Department of Transportation regulations. It is the responsibility of Allied Chemical Co. and the hauler of the waste to ensure that adequate transportation vehicles are used.

The enclosed Manifest Form is to be used in conjunction with the disposal of this waste. Allied Chemical Co. must fill out completely the appropriate portion of the form and return the pink copy to this office upon shipment of the waste. The yellow and white copies shall be sent with the waste when transported to the disposal facility with the remainder of the form completed by indicated parties. The disposal facility shall verify the accuracy of the Manifest and return the yellow copy to this office. This Division retains the right to sample any waste going to this site to ensure compliance with the Manifest. Additional forms are available upon request.

Any changes in composition or volume of this waste, or if any problems are encountered during disposal, this authorization will be nullified. Disposal of this waste at other than the requested facility will require prior written approval from this office.

Sincerely,

Earl M. Williams Jr (EMW)

Earl M. Williams, Jr., P.E., Manager
Industrial Waste Section
Solid Waste Management Division

/kk

cc: W.E. Stilwell
Capers Dixon
Jerry Perkins

Enclosure

Chatham
SW+C

February 8, 1979

Mr. Lenard Holden
P.O. Box 27687
3800 Barrett Drive
Raleigh, NC 27609

Dear Mr. Holden,

It sure was nice to talk to you today concerning the study that you are doing for the Town of Siler City.

The ordinance that you asked me to review, needs up-dating, but should wait until the new study is adopted.

For me to tell you how much it is costing per unit for commercial collection, I need to know the number of hours per week is allotted to this collection. 3-4 hr. per day - 6 days

Sincerely,

O.W. Strickland, Asst Branch Head
Solid Waste & Vector Control Branch
Sanitary Engineering Section

1 cu - (4)

150 lbs

Table 1 Estimated
Monthly Cost for Hand Collection of 125
Commercial Accounts

Item	Per Hour	Units	Total
Hourly wages			
4 collectors @ 2.75 ph.	11.00	2	22.00
2 drivers @ 3.50 ph.	7.00	2	14.00
Fringes 20 percent	3.60	2	7.20
Truck operation and maintenance			
Depreciation (5 yrs @ 8%)			
Overhead, taxes, admins, etc.			
Hourly total			

? hours to service 125 accounts

1 hours to and from landfill (22 miles)

Total

Average Cost per Amount

Average Monthly Cost per Account

Table 2 - Estimated Monthly Cost for Residential Collection for 1200 Residences

(Assume 300 residences daily, 4 days a week and 6 hour days, wages average $3.12 hr.)

	Per Month
hourly wages - 2 men at 3.12 hr	
Fringes 20 percent	
Truck Operation and Maintenance	
Depreciation (5 year 8 percent)	
Overhead, taxes, indirect adm	
Total	

Cost per residence per month

Chapter 10

GARBAGE AND TRASH*

Sec. 10-1. Definitions.

For the purpose of this chapter certain words, terms and phrases shall apply:

(1) *Waste:* Useless, unused, unwanted or discarded materials resulting from natural community activities, including solids, liquids and gases.

(2) *Refuse:* Solid waste, including but not limited to garbage, rubbish and ashes.

(3) *Garbage:* Animal and vegetable refuse resulting from the handling, preparation, cooking and consumption of food, including a minimum amount of liquid necessarily incident thereto.

(4) *Ashes:* Refuse resulting from the burning of wood, coal, coke and other combustible material.

(5) *Rubbish:* Refuse (exclusive of garbage and ashes) including but not limited to paper, rags, cartons, boxes, wood, excelsior, rubber, leather, tree, bush and hedge branches, cuttings and trimmings, yard trimmings, grass, leaves, tin cans, metals, small mineral matter, glass, crockery, dirt, earth and dust.

(6) *Building rubbish:* Rubbish from construction, remodeling repair operations on houses, commercial buildings

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*Amendment note—Ord. No. 1970-4, enacted March 9, and effective May 1, 1970, amended this Code by repealing Ch. 10 and enacting a new Ch. 10 pertaining to the same subject. The nature and extent of the revision effected thereby, render detailed analysis impractical. The editors added italicized catch phrases where appropriate, to facilitate indexing and reference, and deleted §§ 10-10 and 10-11, repealer and effective date, to preserve Code format. Former Ch. 10 was derived from an ordinance enacted Aug. 6, 1959 and from provisions adopted by the Town when the Code of Ordinances was adopted.

Cross reference—Health and sanitation generally, ch. 11.

State law references—Authority to prohibit, abate, suppress things detrimental to public health, G.S., §§ 160-200(6), 160-234; to provide for destruction of noxious weeds, G.S., § 160-200(8); to provide for removal of garbage and trash, charge therefor, G.S., § 160-233; to establish and operate garbage and sewage disposal plants, G.S., § 160-282.

and other structures, including but not limited to excavated earth, stones, brick, plaster, lumber, concrete and waste parts occasioned by installations and replacements.

(7) *Industrial waste:* Sawdust, shavings, feathers, excelsior, cartons, boxes, metal, glass, paper, wood, textiles, chemicals, plastic or other waste materials from processing plants, factories or manufacturing operations.

(8) *Business building:* Any structure, whether public or private, that is adapted for transaction of business, for rendering of professional services, for amusement, for the display or sale or storage of goods, wares, merchandise, articles or equipment, including hotels, apartment houses, rooming houses, office buildings, public buildings, stores, theatres, markets, restaurants, abattoirs, warehouses, sheds, barns and other structures on premises used for or adapted to business purposes.

(9) *Automatic containers:* Waterproof, odorproof containers in size from one cubic yard to eight yards approved by the Town of Siler City for use in commercial, business, industrial and other approved areas.

(10) *Director of public works:* The director of public works of the town, or his agent. (Ord. No. 1970-4, 3-9-70)

Sec. 10-2. Collection practices.

(a) *Generally.* Except as otherwise provided in this chapter and except in the case of emergency arising from an act of God or under circumstances over which the public works department has no control, the department shall collect, remove, and dispose of certain refuse:

(1) In residential sections of the city at least once per week and if possible twice each week.

(2) From business buildings at least two (2) per week; and where deemed necessary by the public works director more than two (2) per week.

(b) *Industrial waste.* Industrial waste shall be collected, removed and disposed of by the operator of the factory, plant or enterprise creating or causing the same in accordance with applicable provisions of this code.

(c) *Building rubbish.* Building rubbish shall be collected, removed and disposed of by the contractor or builder, or in their failure, by the owner of the property.

(d) *Automatic containers.* Where refuse accumulates at business buildings in quantities of more than four (4), thirty (30) gallons cans, the owner or lessor shall be required to use automatic container when notified in writing to do so by the director of public works.

(e) *Business permit required.* No person or persons shall engage in the business of collecting, hauling or transporting in the town any waste without first obtaining a permit from the board of commissioners. (Ord. No. 1970-4, 3-9-70)

Sec. 10-3. Containers required; prohibited containers; prohibited deposits; removal of leaves and cuttings.

(a) Every person occupying a house or residence in the residential area where garbage or refuse exist shall provide containers made of galvanized metal or plastic or approved bags in which shall be deposited all garbage or refuse existing at such buildings or premises.

Each container shall be provided with handles and with a tight fitting cover made of the same material as the container. Containers must not have less than thirty (30) or more than thirty-two (32) gallons' capacity.

Each home and business building shall have a sufficient number of containers to hold the refuse until collected.

(b) All persons doing business in a business building within the town limits shall provide containers as outlined in this section unless deemed obsolete by the director of public works.

(c) Persons occupying business buildings shall store cardboard boxes inside the building unless stored in automatic containers.

(d) No wooden boxes, pails or other wooden or cardboard containers shall be used for garbage and refuse and if used, shall be confiscated by the town. This also includes fifty-five (55) gallon drums.

(e) No person shall throw, drop or deposit any leaves, shrubs or other debris into any catch basin or manhole in the town.

(f) Any person may have leaves removed by the town if such leaves are placed at the curb line between the curb and sidewalk, so that they may be easily handled by the collector. No tree limb, shrubs or other material shall be mixed with the leaves. The leaves shall be collected on days designated for such collection.

(g) No swill, slops, garbage, bones, offal, kitchen waste or refuse shall be carried through the streets of the town except in watertight metal containers with tight fitting covers. (Ord. No. 1970-4, 3-9-70)

Sec. 10-4. Pre-collection practices.

(a) All garbage and refuse shall have liquid drained therefrom before it is placed in the container for collection. All lids to containers shall fit tight after containers are filled.

(b) Any person desiring to place tree trimmings, hedge cuttings, grass, or similar materials for free collection shall cause the material to be placed on the curb line at the street on the area between the sidewalk and the curb.

(1) The collection of tree trimmings shall include nothing more than six (6) inches in diameter. Tree trimmings larger than two and one-half (2½) inches must be trimmed and cut into lengths of not more than thirty (30) inches.

(2) All refuse must be placed in neat, compact piles, a separate pile for each different type of refuse. Brush, trimmings and hedge cuttings, grass and leaves, wood, cardboard and paper, and metal must all be placed in distinctly different piles.

(3) Brush must be piled so that the butt ends are together and in the same direction. Disorganized piles will not be picked up.

(4) Leaves and grass must be placed in plastic bags, which the town provides, except during the time that the

vacuum leaf collection truck is in operation. When said truck is in operation, leaves may be raked to the edge of the street for collection.

(c) All cardboard boxes must be crushed flat before collection.

(d) Tree stumps, tree trunks, and large rocks will not be collected. Appliances (ovens, refrigerators, washers, dryers, etc.), may be removed at the request of the property owner whose property is used for residential purposes, provided that the weight of the individual article can be lifted by two (2) men.

(e) No household will receive more than one refuse pick-up during any one week.

(f) Any household whose refuse is not piled in the proper manner will be notified, in writing, by the public works director. Said notification will indicate what must be done to prepare the refuse for collection.

(g) No collection shall be made from vacant lots.

(h) Once an established collection route is established, any changes must be advertised in the local newspaper once, at least fifteen (15) days before said changes are effective. (Ord. No. 1970-4, 3-9-70; Ord. No. 1975-1, 4-7-75)

Sec. 10-5. Storing of refuse.

(a) Every owner and every occupant or other person in control of any building or land in the town, including vacant property, shall keep the same in a clean and orderly condition and shall deposit refuse for collection in accordance with the

provisions of this code and the regulation of the director of public works. Combustible and non-combustible refuse shall be stored in containers complying with this code.

(b) No person shall throw, drop or deposit, or cause to be thrown, dropped, deposited, on any land in the town (vacant or occupied including specifically streets, alleys, sidewalks and other public and semi-public areas or in all waters under jurisdiction of the Town of Siler City) any waste (including but not limited to refuse, garbage, ashes, rubbish, dead animals or fish, paper, drinking cups, broken glass, tacks, paper, bottles, brush, grass, weeds, and anything injurious to health). If any person, while transporting or hauling or causing to be transported or hauled, such rubbish, or material, or earth excavation, coal, or other material, shall throw, drop or deposit or cause to be thrown, dropped or deposited, such rubbish or material from the body of the vehicle, in violation of the provisions of this subsection, such person must daily clean up and remove such rubbish or material in a manner satisfactory to the director of public works, failing which the department of public works may clean up and remove such rubbish and material, and the town may collect the cost of such cleaning up and removal from such person.

(c) No plantings or obstruction may be made on the right-of-way between the curb and sidewalk fifty (50) feet from the corner of intersections, more than thirty (30) inches high.

(d) It shall be unlawful for any person to unload or deposit any loose or unbagged lime, fertilizer or any other dusty materials or substances upon any lot or other area within the town without first obtaining a permit therefor from the town manager. Such permit shall specifically approve the site for such unloading or depositing of such dusty materials or substances. (Ord. No. 1970-4, 3-9-70)

State law reference—Authority to require removal of rubbish, trash, G.S., § 160-233.

Sec. 10-6. Points of collection.

(a) *Residential areas.* Containers in residential areas shall be kept in the back yard, preferably near the kitchen area where collection is to be made on the day designated for such collection.

(b) *Containers required.* No garbage shall be collected unless it is in containers approved in this code.

(c) *Business areas.* Business building collection areas shall be from the rear, side or in certain cases the front. Where front collection points are used empty containers shall not be left on the street more than thirty (30) minutes after collection. The best location in this instance shall be determined by the director of public works.

(d) *Vacant lots; removal of heavy objects.* No collection shall be made from vacant lots nor shall any large rocks, tree trunks, tree stumps, tree limbs of more than five (5) feet in length or seven (7) inches in diameter or other heavy objects be moved by the town. However, in certain special clean-up periods designated by the town commissioners this paragraph may be waived by the director of public works.

(e) *Charges for special collections.* Tree trunks, small rocks, tree stumps, tree trimmings, or hedge cuttings, heavy grass, hay or other similar materials more than five (5) feet in length or seven (7) inches in diameter will be removed at the request of the owner of property used for residential purposes at a cost payable in advance of five dollars ($5.00) per truck load or fraction thereof, provided the weight of the individual article can be lifted by one man and the public works department has the time available.

(f) *Placing materials for special collection.* Materials to be collected by special collection shall be placed on the curb line at the street on the area between the sidewalk and the curb in neat compact piles. (Ord. No. 1970-4, 3-9-70)

Sec. 10-7. Sanitary landfills.

(a) It shall be unlawful for any person to dump or deposit from trucks or trailers any waste, garbage, ashes, rubbish, building rubbish, combustible refuse or industrial waste upon any of the sanitary land-fills of the town, except as herein provided.

(b) Any person residing within the town limits desiring to dump private waste matter collected within the town at

the town's sanitary landfill shall have this privilege provided they secure an identification permit from the town and delivery is made Monday through Friday from 7:15 a.m. to 3:30 p.m., on Saturdays from 8:00 a.m. to 11:30 a.m.

(c) At no time shall any person place or deposit in any town's landfill any explosives or flammable liquids without the express permission of the director of public works.

(d) No unauthorized person shall collect or salvage any material from or loiter on municipal disposal properties, nor shall any person set fire to any materials which have been deposited thereon.

(e) No person shall dump any refuse at any time at the gate or on any entrance of any municipal disposal properties.

(f) This section shall not apply to employees of the department of public works in the performance of their assigned duties.

(g) It shall be unlawful for any person to trespass upon the sanitary landfill operated by the town.

(h) It shall be unlawful for any person not a resident of the town to deposit or cause to be deposited for collection by the town, any garbage, trash or refuse in any container within the town. It shall be unlawful for any person to deposit or cause to be deposited any garbage, trash, refuse, or other matter originating out of the town limits in the sanitary landfill without first obtaining a permit from the town manager, and having paid such fees therefor as determined by the board of commissioners. (Ord. No. 1970-4, 3-9-70)

Sec. 10-8. Fees.

Any business building, political subdivision or facility or eleemosynary charitable institution that utilizes the refuse collection facilities and procedures of the Town of Siler City shall pay such amount as may be determined from time to time by the board of commissioners, such fees to be commensurate with the number of collections required and the amounts of such collection. (Ord. No. 1970-4, 3-9-70)

Sec. 10-9. Penalty provision.

Violation of any of the provisions of this chapter shall constitute a misdemeanor, and punishable as by law provided; each day's violation shall constitute a separate offense. (Ord. No. 1970-4, 3-9-70)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Chatham

DATE: May 30, 1978

SUBJECT: Review of 201 Facility Plan

FROM: Craig Brown
Residuals Management Branch

TO: Harold Duhart, Project Manager
N.C.S.S. - Water Division

SUMMARY

The Residuals Management Branch has completed the review of the

Goldston, N.C. 201 Plan.

☐ The Plan does not contain documentation that the State Solid Waste Agency has approved the landfill or method specified.

☐ The Plan does not contain documentation of an agreement between _____ and a local governmental unit or private enterprise operating an approved landfill to accept sludge from the specified facility.

☐ The Plan meets the necessary requirements.

☒ Other The description of the selected treatment process did not indicate that sewage sludge would be generated as a by-product of the treatment process. We have no further comments on this plan.

ACTION

☐ Condition Step 2 of this project to require the applicant to obtain certification before final payment.

☒ None

☐ Other

BACKGROUND

Division coordination of 201 Facility Plan Reviews. Memorandum of Understanding, dated 11/24/75.

EPA Form 13:

C.C. Jerry Perkins - N.C.
File 9.6.8.8 / CSB

Chatham
M&R

STATE OF NORTH CAROLINA

DEPARTMENT OF HUMAN RESOURCES

Division of Health Services

JAMES B. HUNT, JR.
GOVERNOR

SARAH T. MORROW, M.D., M.P.H.
SECRETARY

JACOB KOOMEN, M.D., M.P.H.
DIRECTOR

P. O. Box 2091 Raleigh 27602

January 28, 1977

Reichhold Chemicals Inc.
Box 163
The Plant Road
Moncure, N. C. 27559

Dear Sir:

The management of residual industrial wastes which may be hazardous, potentially hazardous, or hard to handle, such as sludges, semi-solids, liquids, etc., has become a major problem in North Carolina.

Your assistance is needed to provide the Solid Waste & Vector Control Branch, Division of Health Services, with information on the present status of the management, volume, and composition of these type wastes in North Carolina. This information is needed to develop an orderly and reasonable implementation schedule for Public Law 94-580. The 94th Congress enacted Public Law 94-580 on October 21, 1976. Subtitle C of this Public Law is related to the management of hazardous wastes.

In cooperation with the Environmental Protection Agency, this agency is making a statistical survey of industries in North Carolina to obtain the necessary data for program planning and management of these wastes. A copy of the data collection form is enclosed. It is requested that someone familiar with industrial wastes generated by your facility review the form. The Solid Waste & Vector Control Branch representative that serves your area will contact your company by telephone in the near future to schedule an appointment with your representative so that the data forms may be completed.

If there are questions with reference to this survey, your calls or correspondence should be addressed to:

O. W. Strickland, Program Supervisor
Solid Waste & Vector Control Branch
Division of Health Services
P. O. Box 2091
Raleigh, North Carolina 27602
Telephone: (919)733-2178

Your cooperation is appreciated.

Jerry C. Perkins, Acting Head

Enclosures

cc: Mr. Terry F. Dover

July 27, 1972

Mr. Julian M. Foscue, III
District Sanitarian
Asheboro Regional Office
146 South Fayetteville Street
Asheboro, North Carolina 27203

Dear Mr. Foscue:

I received a call from Mr. O. D. Grey, Route 1, Pittsboro, North Carolina, regarding the open dump that is being operated by Mr. Charles Howard, Contract Collector. On your next visit to the area I would appreciate your making an investigation of this facility and making recommendations to Mr. Howard regarding the requirements needed to alleviate this condition. Also, please contact Mr. Grey and discuss your recommendations with him.

Very truly yours,

Sidney H. Usry, Chief
Solid Waste & Vector Control Section
Sanitary Engineering Division

SHU:bm
cc: Mr. O. D. Grey

Chatham

STATE BOARD OF HEALTH
SANITARY ENGINEERING DIVISION
RALEIGH, NORTH CAROLINA

REPORT OF INVESTIGATION OR INSPECTION OF Solid Waste Complaint

Place visited Charles Howard Dump Date August 9 and 24 1972

Address Route 1, Pittsboro, N. C. Time spent 3 hours

By whom Jimmy Collins, Sanitarian, Chatham County Health Dept., Pittsboro, N. C.;
Julian M. Foscue, III, District Sanitarian, N. C. State Board of Health

Persons contacted Mrs. O. D. Grey
(Owner, agent, tenant, manager, other)

Reason for visit Mr. Grey's complaint to the State Board of Health

Copies to: Mr. Jimmy Collins, Sanitarian, Chatham County Health Department, Pittsboro, N.C.
Mr. O. D. Grey, Route 1, Pittsboro, N. C.

REPORT:

On August 9, 1972, Mr. Jimmy Collins, Sanitarian, Chatham County Health Department, and I investigated conditions at an open, burning dump operated by Mr. Charles Howard, Route 1, Pittsboro. Our visit was in response to Mr. O. D. Grey's telephone call to the State Board of Health regarding conditions at the dump.

After observing conditions at this dump and talking to Mr. Grey's wife concerning alleviation of this problem, Mr. Collins and I met with Mr. Howard's wife. Mrs. Howard told us that her husband planned to use this facility only until the county facility became available.

I recommended to Mrs. Howard that her husband cover the existing solid waste with two feet of compated earth and excavate a trench to receive solid waste until the county facility becomes available.

Mr. Collins and I visited the site again on August 24, 1972, and Mr. Howard had followed my recommendations.

JMF:bm

Chatham

March 26, 1970

Mr. Randolph Hendricks
Planning Coordinator
State Planning Division
Clearinghouse and Information Center
Department of Administration
Raleigh, North Carolina 27602

Dear Mr. Hendricks:

Reference is made to your Clearinghouse Notification No. 70-0168 regarding a solid waste disposal program for Chatham County. This office has provided technical assistance in the preparation of a program for this county and feel that financial assistance through the Farmers Home Administration would greatly enhance the implementation of the solid waste disposal program.

Very truly yours,

Sidney H. Usry, Chief
Solid Waste & Vector Control Section
Sanitary Engineering Division

SU/mg

cc: Mr. B. Gene Barrett

DEPARTMENT OF ADMINISTRATION
State Planning Division
Clearinghouse and Information Center
Raleigh, North Carolina 27602

NOTIFICATION REFERRAL

ACTION REQUESTED

SANITARY ENGINEERING
DIVISION

To: Name B. Gene Barrett, Planning Officer

Agency State Board of Health

Address

Re: Clearinghouse Notification No. 70-0168

The attached Notification to Clearinghouse of Intent of Apply for Assistance is referred to you for review and comment in accordance with Project Notification and Review System procedures established under Bureau of the Budget Circular No. A-95.

TELEPHONE RESPONSE REQUESTED BY March 27, 1970

WRITTEN RESPONSE REQUESTED BY April 7, 1970

In each response, please refer to the Clearinghouse Notification No. shown above.

It is recommended that you contact the applicant directly if your agency needs additional information on the proposed application, or if there are any questions which may be resolved in this way.

Please reply to: Randolph Hendricks, Planning Coordinator
State Planning Division
Telephone 829-4131

C H Notification No.: 70-0158 FORM APPROVED - BUREAU OF THE BUDGET NO. 80-R0176

APPLICATION

FEDERAL ASSISTANCE FOR PUBLIC WORKS AND FACILITY TYPE PROJECTS

(Please read the Instructions before completing this application. Submit application in original and one copy. Attach additional sheets if necessary.)

DO NOT WRITE IN THIS AREA - *FOR GOVERNMENT USE ONLY*

IA NO.	REFERRAL		
AGENCY	DATE RECEIVED	DATE REFERRED	TO

AGENCIES ASSUMING JURISDICTION

AGENCY	DATE	PROJECT COMPONENT	PROJECT NO.

1A. APPLICANT (Legal name of applicant; proposed name if not incorporated) Chatham County — February 2, 1970

CITY OR TOWN Pittsboro, (County) Chatham, North Carolina 27312 (Zip code)

1B. TYPE OF ORGANIZATION (Check appropriate box)

☐ STATE GOV. AGENCY ☐ LOCAL GOV. UNIT ☐ NON-PROFIT ORGANIZATION ☐ OTHER (Specify)

2. LOCALITIES TO BE SERVED

CITIES, TOWNS, OR AREAS (List separately)	COUNTY	POPULATION 1960	POPULATION CURRENT (Est.)	POPULATION TO BE SERVED BY PROJECT
Bonlee, Bynum, Farrington,	Chatham	26,785	25,000	22,100
Goldston, Harpers X Roads,				
Moncure, Pittsboro, Siler City				
and Silk Hope				

3. DESCRIPTION AND PURPOSE OF PROPOSED PROJECT

A. DESCRIPTION
Garbage land-fill facilities for the county.

B. PUBLIC INTEREST AND NECESSITY
Due to many garbage dumps which create a health hazzard in the county, the people of the county have been asking the county commissioners to provide facilities for garbage disposal for the county residents.

C. PLANNING AGENCY (County, Multi-county, Regional, etc.)

☒ REVIEWED BY PLANNING AGENCY (Attach comments) ☐ NOT REVIEWED BY PLANNING AGENCY (If not, explain)

101-102

STANDARD FORM 101
REVISED JANUARY 1968
PRESCRIBED BY THE BUREAU OF THE BUDGET
CIRCULAR NO. A75 (REV.)

4. METHOD OF FINANCING *(In thousands of dollars)*

SOURCE OF FUNDS	COMPONENTS				
	WASTE		WATER	OTHER *(Describe in G. below)*	TOTAL
	TREATMENT (1)	COLLECTION (2)	(3)	(4)	(5)
A. FEDERAL GRANT REQUESTED	$ 13,500.	$	$	$	$
B. FEDERAL LOAN REQUESTED					
C. OTHER FEDERAL CONTRIBUTION					
D. STATE CONTRIBUTION					
E. APPLICANT CONTRIBUTION	31,500.				
F. ESTIMATED TOTAL PROJECT COST	$ 45.000.	$	$	$	$
G.					

5. OTHER FEDERAL ASSISTANCE - PREVIOUS OR PENDING

NAME OF AGENCY	TYPE OF ASSISTANCE	INDEBTEDNESS OUTSTANDING, IF ANY	AMOUNT REQUESTED
NONE			

The applicant represents that the data in this application are true and correct to the best of his knowledge and belief and that the filing of this application has been duly authorized by the governing body of the applicant.

EXACT LEGAL *(Corporate)* NAME OF APPLICANT *(If unincorporated, enter proposed name)*

Chatham County

ATTEST *(Signature of attesting officer)*

TITLE Lemuel R. Johnson
Secretary

BY *(Signature of authorized officer)*

TITLE F. June Wrenn
Chairman, Chatham County Commissioners

NOTE: Additional Information May Be Requested To Support This Application.

(DO NOT WRITE IN THIS SPACE - *FOR GOVERNMENT USE ONLY*)

Std. Form 101 (continued)

C. The garbage disposal problem has been discussed by the Chatham County Planning Board on several occasions. The planning board, when meeting with a group representing the Chatham County Technical Action Panel on December 1, 1969, stated that they see the need for garbage disposal facilities; have called the matter to the attention of the County Commissioners; and that the County Commissioners have requested the State Board of Health to make recommendations for establishing land-fills through-out the county, into which residents can deposit garbage.

2-2-70

Chatham Co

TABLE OF CONTENTS

Chatham Surv

SILER CITY

SOLID WASTE STUDY

PRELIMINARY DRAFT
FOR STUDY ONLY

INTRODUCTION

In solid waste management, as in other aspects of administration, good decision-making is nearly synonymous with good city management. In the past, however, decisions regarding solid waste management have been largely on intuition and local custom rather than on the experience of many communities and methodically developed information. To provide local officials with a broader basis for decision-making, the Office of Solid Waste Management Programs (OSWMP) of the U. S. Environmental Protection Agency developed the Decision-Makers Guide in Solid Waste Management. The guide draws on information which has been developed over the last 9 years from contractual efforts, demonstration grants, and in-house analyses.

This study of the Siler City Solid Waste System utilizes information, techniques and management options available, from a wide range of topics on the subject of solid waste to effectively analyze their current system.

This study seeks to identify the problems of the existing system, and attempts to assess estimated collection costs and current productivity levels. A study outlining information and data from a national study on residential collection systems is used as a comparative guide. Broad organizational options available to a local manager and some system improvement strategies are also presented.

This study further seeks to provide the manager of Siler City with some major alternatives available to the town, plus their anticipated costs and benefits. If the recommendations and conclusions presented in this study as proposed system improvements are implemented, escalating costs and the low productivity levels of the existing system should be eliminated.

This study offers the reader a case study of the Siler City Waste System as of March 1979

SECTION I

EXISTING SYSTEM

REFUSE COLLECTION IN SILER CITY

Existing System

Refuse collection in the Town of Siler City is divided into three distinct phases: (1) resident and collection; (2) commercial and industrial collection - municipal and/or private; and (3) trash and leaf collection. A brief description of each follows.

Residential collection is provided to all town residents at no direct cost by the Siler City Department of Public Works. Residential collection occurs at the curbside all weekdays except Wednesday. Two three-man crews consisting of two (2) drivers and four (4) loaders, utilizing two (2) rear packers begin to pick up the town's garbage daily, beginning at 7:00 a.m. Pickup occurs from both sides of the streets and roads. Residential collection is accomplished by systematically dividing the town into four (4) quadrants (see Map 1). U.S. route 421 divides the town east and west and U.S. route 64 divides the town north and south. Two rear packer trucks begin each day from a central point and work outward for approximately one mile, also collecting commercial garbage customers along the route. The task incentive system is used (meaning the loaders can get off when their daily route is completed). The drivers must take the refuse to the landfill before they can get off. Curbside pickup allows the loaders to manually dump the garbage containers (mostly 30-gallon galvanized cans) directly into the hopper of the rear loading packer trucks. An estimated 1200 residences are provided residential garbage pickup twice weekly.

Commercial service is rendered Monday through Friday with limited pickups occurring on Saturday mornings (7-12). Collection on Wednesday is accomplished by utilizing one three (3) man crew which picks up commercial garbage only. Refuse is picked up from alleys, streets and at the rear of some commercial establishments.

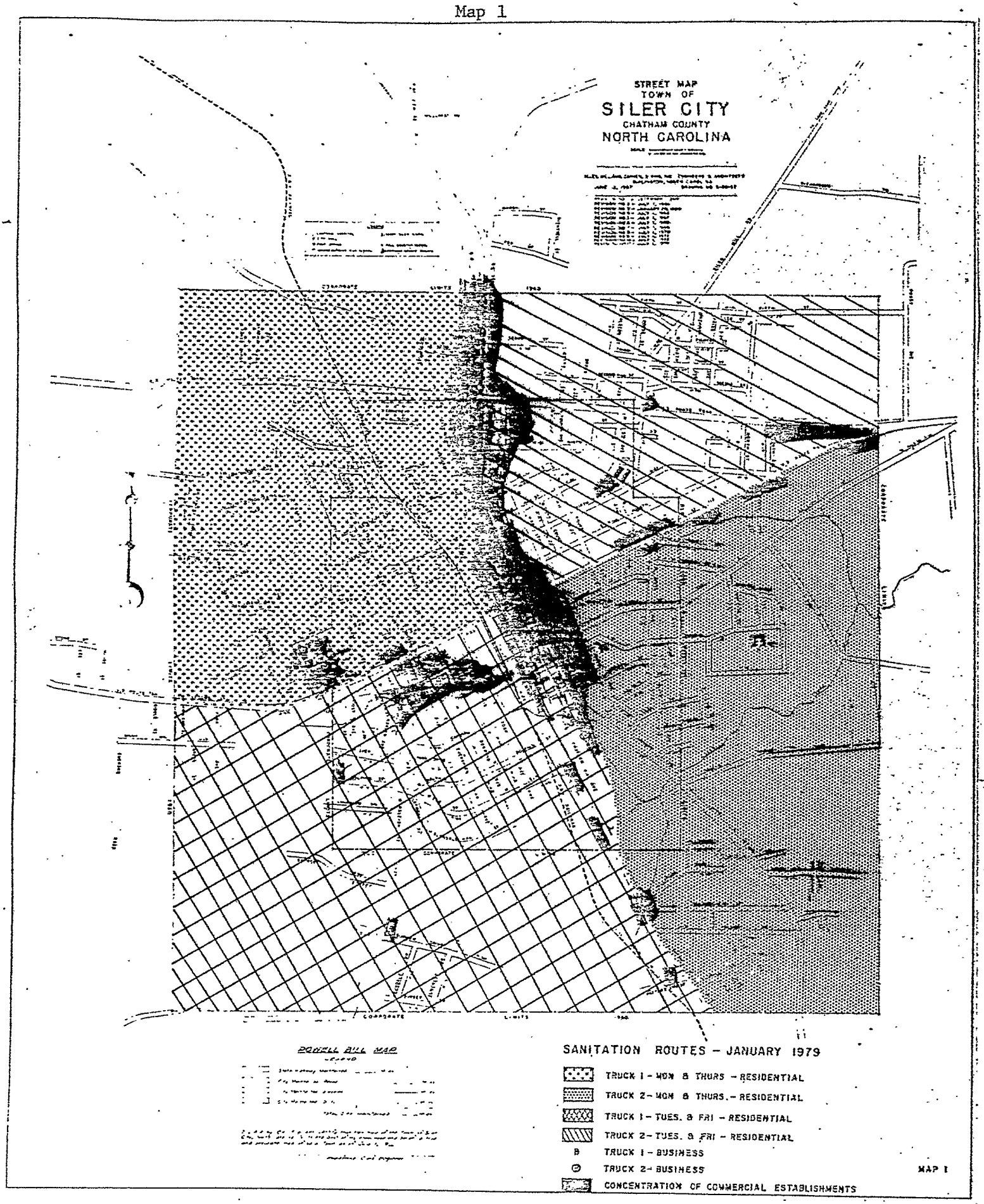
Commercial garbage and trash in town is stored for collection, using several different methods, which are: (1) some businesses in the central business district (see Map 1) utilize open storage concrete bins approximately four feet by four feet (4' x 4') in size that are located in the alleys behind their businesses. The storage bins are town maintained but are definitely outdated as far as contemporary (the 70's or containerized) standards are concerned; (2) some other businesses utilize the thirty (30) gallon galvanized can as required by the town ordinance for storage of garbage; and (3) some other businesses use fenced in areas that provide some protection for the galvanized cans and still allows the merchant to discard boxes and other materials that are not needed; (4) some other businesses utilize what is known as a garbage room. This arrangement involves a garbage storage area at the rear of the building where trash (boxes, etc.) is manually thrown in (plus galvanized cans are stored there) for pickup. Some large volume commercial establishments contract their collection and disposal to a private company. An estimated 125 commercial establishments are provided free garbage pickup six days a week.

Industrial collection and disposal is the responsibility of the industry or the large volume commercial establishment that generates the waste. Considering that Siler City does have fifteen or twenty industries located there, a business does exist for several private garbage collection companies.

Trash and Leaf Collection

Trash pickup is provided to the residents of Siler City year-round. Residents are asked to call in to the sanitation department when there is trash to be picked up. Trash collection appears to be operating in the best manner available for the Town.

Map 1


STREET MAP
TOWN OF
SILER CITY
CHATHAM COUNTY
NORTH CAROLINA
POWELL BILL MAP
SANITATION ROUTES – JANUARY 1979
TRUCK 1 – MON & THURS – RESIDENTIAL
TRUCK 2 – MON & THURS. – RESIDENTIAL
TRUCK 1 – TUES. & FRI – RESIDENTIAL
TRUCK 2 – TUES. & FRI – RESIDENTIAL
B TRUCK 1 – BUSINESS
TRUCK 2 – BUSINESS
CONCENTRATION OF COMMERCIAL ESTABLISHMENTS
MAP 1

Leaf collection in town is mainly carried out during a period from approximately October 15 to January 15 each year. The department owns a leaf truck that operates during this period, utilizing a sucking apparatus that is attached to the leaf truck.

FACT SHEET

Date: February, 1979

Landfill: Yes x No ___

Town: Siler City

County owned x

County: Chatham County

City owned ___

Latest population estimate: 4910

Residences served: 1200
Twice weekly

Commercial/industrial accounts served::Estimated 125 twice weekly.

EVALUATION PARAMETERS

1. Point of Collection

   Commercial - alleys and out back of the business
   Residential - curbside
   Industrial - provide own collection or contracts with private hauler

2. Frequency of Collection

   Commercial - 6 days a week
   Wednesday and Saturday morning is commercial pickup only
   Residential - curbside, 4 days a week
   Monday, Tuesday, Thursday, Friday

3. Crew Size

   Two (2) three (3) man crews
   - 4 collectors @ $2.75 per hour
   - 2 drivers @ $3.50 per hour

4. Equipment Type

1-1976 Cobey Model 800 RL 20 20 cubic yard rear loader	2-1971 Garwood load packer 18 cubic yard rear loader	3-195-Chevrolet leaf truck

5. Collection Methodology (see Map)

-collection starts from a central point in town and moves out approximately one mile
-commercial garbage is usually picked up first
- garbage is handled manually, utilizing a rear loading packer
- the town is divided into four distinct routes (see Map 1)

6. Incentive System (Yes)

-each crew has a route
-average day is approximately 6.5 hours
-the crew can go home after is has finished its designated route

7. Type of Storage Containers

Residential - usually 30 gallon galvanized cans
- some carts (roll-out type are being used as a choice)
Commercial - open concrete bins at rear of the downtown commercial areas
- restaurants mainly use 30 gallon cans
- garbage rooms are utilized
- enclosed areas with cans inside for storage
- others just sitout boxes, etc.
Industrial - some use metal dumpsters; unknown about what others use

8. Amount of Waste Generated (Daily)

Residential - average pickup is 300-325 houses daily per crew
- average about 38 cubic yards of residential and commercial daily
Commercial - average 12-14 yards a day of commercial waste
- average ½ to 3/4 load on Wednesday of commercial waste

9. Work Day

-averages 6.5 hours a day, each crew is paid for 8 hours daily
-Monday, Tuesday, Thursday, Friday - is commercial and residential pickup
-Wednesday and Saturday is commercial pickup only
-Saturday morning pickup is over around noon
-landfill closes at 12:30 p.m. on Saturday

SECTION II

RECENT STUDIES AND FUNDING

(An Overview)

RECENT STUDIES AND FINDINGS

In a statement creating the National Commission on Productivity, ex-President Nixon said:

> "In order to achieve price stability, health growth, and a rising standard of living, we must find ways of restoring growth to productivity. The task of the Commission is to point the way toward this growth....in the years ahead."

In 1970, nearly one out of every six Americans was working in the public sector; nearly 80 percent of these public employees worked for state and local government, and yet little was known how productive these public servants were.

In February of 1973, the Commission began (among other projects) a review of solid waste management productivity. Seeking help from a wide cross section of public works directors, municipal officials, labor leaders, managers of private firms, academicians, and representatives from relevant professional associations, an advisory group was formed. Concentrating on the field of residential services, collection--accounting for roughtly 80 percent of the total cost of solid waste operations and the most susceptible to measurement--was chosen as the area possessing the greatest likelihood for immediate and significant improvements.

What is Productivity?

Productivity is the ratio of output--or the results of activity--to input--or the resources consumed by the activity. By utilizing measures of productivity, a manager is in a much better position to:

(1) Compare the performance of his system with similar ones;

(2) Monitor the progress of this system over time; and

(3) Identify and analyze key problem areas.

Drawing upon the expertise of the Office of Solid Waste Management Programs (OSWMP), numerous productivity studies were undertaken in eleven communities throughout the United States. The results of these are shown in Table 1.

TABLE 1

PRODUCTIVITY AND COST ANALYSIS FOR RESIDENTIAL COLLECTION SYSTEMS, 1973*

	Collection policies and methodologies										
	Curb-alley systems									Backyard systems	
System number	1	2	3	4	5	6	7	8	9	10	11
Collections per week	1	1	1	1	1	1	2	2	2	1	1
Crew size	1	1	2	2	3	3	1	2	3	2	2
Incentive system	Task	8 hr	Task	8 hr	Task	8 hr	Task	Task	Task	Task	8 hr
Collection patterns	One side	One side	One side	One side	Both sides	Both sides	One side	One side	Both sides	Tote barrel	Tote barrel
Vehicle size (cu yd) and type†	25 SL	25 SL	20 RL	25 RL	20 RL	25 RL	33 SL	8 SL	20 RL	20 RL	13 RL
	Percent of total crew time spent on various collection activities										
Transport	34.8	32.2	31.5	30.2	24.2	35.4	22.6	27.2	30.6	18.3	20.6
On route:											
Driving	17.9	13.5	8.9	12.2	5.8	3.1	24.7	10.0	7.2	‡	‡
Riding/walking§	0.0	0.0	7.8	11.6	11.8	5.6	0.2	18.1	14.5	‡	‡
Collecting	45.8	51.5	30.6	19.5	35.7	38.2	50.1	27.8	29.3	61.7	79.4
Waiting (including compaction)††	0.5	1.8	20.8	26.8	22.2	17.3	1.1	6.5	18.5	‡	‡
Other††	0.7	1.0	0.4	0.2	0.3	0.4	1.3	10.4	0.5	‡	‡
Total productive time	98.5	97.2	68.0	68.3	61.3	58.7	97.6	69.5	61.0	‡	‡
	Route characteristics (daily averages)										
Pounds per home per collection	46.2	71.0	49.3	50.5	62.2	64.9	28.2	24.4	33.1	33.9	51.1
Number of bags per home per collection	1.5	1.3	2.6	4.6	3.6	1.5	0.9	0.5	1.2	0.0	1.4
Number of cans per home per collection	2.3	2.7	1.3	0.4	1.5	2.7	1.5	1.5	1.1	1.2	2.4
Number of miscellaneous items per home per collection	0.7	1.1	0.7	0.5	1.0	1.7	0.5	0.5	0.4	0.0	0.5
Collection miles per day	10.5	6.1	10.1	13.1	10.5	4.5	13.7	20.5	10.4	6.9	6.6
Transport miles per day	46.1	18.8	32.6	29.9	14.3	34.4	22.2	12.0	33.4	6.0	17.6
Collection hours per day	3.8	4.6	4.8	4.7	3.9	4.9	4.9	4.1	4.4	5.1	5.5
Transport hours per day	1.7	2.0	1.9	1.8	1.0	2.5	1.1	1.4	1.6	1.0	1.2
Hours worked per day	5.9	6.7	7.0	6.7	5.2	7.6	6.3	5.7	6.3	6.2	6.9
Loads per day	1.8	1.6	2.4	1.9	2.2	1.6	1.0	4.4	2.3	1.0	1.9
Services per day	410	254	512	575	407	306	410	574	854	364	243
Tons per day	9.4	9.0	12.6	14.5	12.6	9.7	5.7	7.0	14.1	6.2	6.2
	On-route productivity										
Services per crew per collection hour	107.3	55.7	107.0	123.3	104.5	62.7	84.2	138.4	200.5	72.1	44.4
Tons per crew per collection hour	2.5	2.0	2.6	3.1	3.3	2.0	1.2	1.7	3.3	1.2	1.1
Services per crewman per collection hour	107.3	55.7	53.4	57.7	34.9	20.9	84.2	66.6	66.5	35.3	22.1
Tons per crewman per collection hour	2.5	2.0	1.3	1.5	1.1	0.7	1.2	0.8	1.1	0.6	0.6
	Cost efficiency**										
Total cost per home per year	$9.58	$15.60	$11.96	$11.44	$20.28	$26.60	$19.24	$26.52	$24.96	$16.64	$24.44
Total cost per ton	$8.29	$8.46	$9.53	$8.72	$12.82	$17.13	$13.45	$21.15	$14.67	$19.26	$18.41

*ACT Systems, Inc. Residential collection systems. v.1. Report summary. Environmental Protection Publication SW-97c.1. [Washington], U.S. Environmental Protection Agency, 1974. 106 p.

†RL, rear loader; SL, side loader.

‡Not available.

§Driving, riding for one-man crews.

††Nonproductive time.

**Costs have been normalized across all 11 systems to permit intersystem comparisons; therefore, these figures do not reflect actual collection costs.

Note: System No. 9 is currently being used in Siler City.

Defining several terms in Table 1 might assist in its interpretation:

Incentive System:

*Task - A system in which a set number of streets and/or houses is assigned to the collection crew and when the task is completed the crew is permitted to go home.

Standard day - A system in which if crew members finish their task early they must remain on the job until their 8 hours are up; conversely, if they don't finish in 8 hours, they receive overtime pay--the result is that there is no real incentive to "hustle" on the routes.

Method:

1-side - A method in which refuse is picked up from only one side at a time, necessitating two separate passes down the road to collect from all the residents.

*2-sides - A method in which refuse is picked up from both sides of the street simultaneously.

Several features in Table 1 are worth of comment. First, notice that the one-man crews spent considerably less time waiting and more time collecting than did two- and three-man teams. This is observed in its entirety by noting Crew Productive Time (%) under the Activity heading. (While not noted on the table, all the side loaders mentioned had been notified to allow driving from the right hand side, thus allowing the driver to step from the cab right to the refuse container). The three one-man crews consistently exhibited productive time exceeding 97%. Second, notice the continued superiority of the one-man crew in the Tons/Crewman ratio under the heading of On-Route Productivity Per Collection Hour. Tonnage of 2.5 and 2.0 led all others under the once-a-week category; and 1.2 tons per crewman was superior to the others under a

NOTE: The asterisk indicates the systems used in Siler City.

twice weekly pickup. Third, under the heading of Route Characteristics, observe that while tons/day generally increases as crew size increases, it is not a linear relationship (i.e., two man don't collect twice as much refuse as one). Notice that in comparing systems 3 and 5, adding one man and picking up from both sides resulted in an increase of only .03 tons/day (certainly not worth the additional expense of one man for only .03 ton). In comparing systems 4 and 6, adding another crew member actually reduced tons/day--something one would not expect when comparing their crew productivity time (%) of 58.3% to 58.7%. And fourth, under Collection Costs, notice the cost/ton/year ($8.29 and $8.46) for the once weekly curbside, one-man operation is least of all. Referring to the feature previously mentioned, in comparing systems 3 and 5 and 4 and 6, notice that adding one more man (for a .03 increase in tons/day) increased the cost from $9.53 to $12.82 or 34.6% and 8.72 to $17.13 or 96.6% respectively.

Of course though, the comparisons made are between one city and another and it is improper to imply that such findings would necessarily occur were those changes all made within the same city. Recognizing this deficiency though, some general observations can nevertheless be put forth. One-man crews spend a larger portion of their time on productive activities, than other crew sizes; a task incentive system appears superior to a standard day system; once-a-week pickup is less expensive than twice-a-week pickups; and curbside pickup is superior to back-yard pickups.

In a report entitled Eleven Residential Pickup Systems Compared for Cost and Productivity written by Kenneth Shuster of OSWMP, a considerably more detailed analysis produced these additional comments. About 33 percent fewer crews and units are needed for once-a-week than twice-a-week services, the

average number of hours handled by a twice weekly pickup is approximately two-thirds the number for once weekly operations, the productivity of backyard systems, in terms of households serviced and tons collected per pickup hour, is approximately one-half that of the corresponding curb and alley system; and since personnel charges are significantly more than the equipment costs, reduction programs should first look in the area of labor costs which can be lowered by improving productivity and by reducing the number of workers, or both. There is also a strong tendency for personnel productivity to increase as crew size decreases.

Another report entitled Residential Collection Systems which analyzed results from the same eleven communities concluded some of the following:

(1) Collection systems operating under the task incentive system tend to work a smaller percentage of the normal work week than the standard day systems;

(2) The collection production and productivity of the task incentive systems tend to be greater than the collection production and productivity of standard day systems.

(3) Curbside is more productive and cost efficient than backyard service; and

(4) For backyard systems, the task incentive system has a greater productivity than that of the standard day system.

In addition, all of the factors considered in the study--point of collection, incentive system, and percent one-way items--were ranked so as to depict those which could be expected to produce the most cost savings. For each of these factors, the direction to improve costs is from less to better: point of collection (backyard to curbside), crew size (larger to smaller), frequency of collection (twice to once weekly), incentive system (standard to task), and percent one-way items (less to more).

TABLE 2

ORDER AND MAGNITUDE OF CHANGES

Factor	Order For Cost Efficiency	Relative Magnitude of Effect
Point of Collection	1	52
Crew Size	3	9
Frequency of Collection	2	28
Incentive System	4	1
Percent One-Way Items	4	1

Note: It should be emphasized that the relationship indicated is for the results of this study and may not agree with the conditions of a specific system.

In a recent EPA study entitled A Study of Solid Waste Collection Systems Comparing One-Man with Multi-Man Crews, several conclusions of particular relevance to Siler City were reached:

(1) For curbside collection of refuse, one-man crews were more efficient than multi-man crews;

(2) Multi-man crews were more efficient for backyard carryout collection of refuse;

(3) With existing collection equipment designs, side-loading compactor vehicles were the most suitable type of one-man operated equipment for curbside collection operations;

(4) Successful implementation of a one-man collection system will probably require: higher salary rates, potential upward mobility in the job structure, employees with a sense of personal pride and responsibility, and engineering evaluation of route structure and equipment requirements;

(5) For curbside collection, the two-and three-man crews studied failed to speed collection time sufficiently over that achieved by the

one-man crew to compensate for the additional man hours involved;

(6) The use of disposable containers may effect a significant reduction in the collection time/stop--as much as 15% to 50%;

(7) A side loader with a right hand (RH) drive produces consistently a lower standard collection time for the full range of curbside pickup than a left hand (LH) drive; and

(8) One-man crews consistently loaded 8 or more tons/day from curbside locations and many one-man crews loaded 10 to 12 tons.

SECTION III

COLLECTION COSTS

and

PRODUCTIVITY IN SILER CITY

Assessing Present Productivity

It seems reasonable to say that any community contemplating a change in its solid waste collection system would like to be able to compare their present cost and efficiency figures with those of comparable towns and also with national or regional indicators. Such information can be used as supportive documentation by management which will indicate that alternative methods may increase productivity, reduce costs, and save money for the community. The following analysis offers management in Siler City a sound estimate of current collection and disposal costs.

Assessing Present Collection Costs (Residential and Commercial)

Solid waste in Siler City is collected jointly, meaning that residential and commercial waste are collected together for four (4) days a week by two crews. Collection on Wednesday and Saturday mornings is confined to commercial only, utilizing one crew (a driver and two loaders). The following table will outline current estimated costs based on hourly costs to operate a two (2) rear packer. Current costs estimates (3-15-79) are provided by the North Carolina Department of Human Resources, Division of Health Services, Office of Solid Waste and Vector Control, Sanitary Engineering Section, Bath Building, Raleigh, N. C.

TABLE 3 HOURLY COSTS TO OPERATE A REAR-PACKER GARBAGE TRUCK

Hourly Wages	Per Hour
2 collectors @ $2.75 per hour	$ 5.50
1 driver @ $3.50	3.50
Fringes - 20%	1.08
Truck Operation and Maintenance	2.50
Depreciation	3.00
Overhead, Taxes, Insurance, Administration, etc.	1.00
Hourly Total	$16.58

TABLE 4

PAID HOURS ALLOCATED TO SOLID WASTE COLLECTION IN SILER CITY WEEKLY

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Total Hours
Residential	8	8		8	8		32
Commercial	8	8	4	8	8	4	40
TOTAL	16	16	4	16	16	4	72

TABLE 5

ESTIMATED SOLID WASTE COLLECTION COSTS FOR SILER CITY IN FY-78

Residential Costs (1200 residences)

16.58* x 32**	= $	530.56 weekly
530.56 x 52	=	27,589.12 annually
27,589.12 ÷ 12	=	2,299.08 monthly
2299.08 ÷ 1200	=	1.91 per residence per month

Commercial Costs (125 accounts)

16.58* x 40**	= $	663.20 weekly
663.20 x 52	=	34,486.40 annually
34,486.40 ÷ 12	=	2,873.87 monthly
2873.87 ÷ 125	=	22.99 per account per month

Residential and Commercial Costs = Total Cost

27,589.12 + 34,486.40 = $62,075.52 (total annual cost in FY-78)

Actual amount budgeted in FY-78 = 44,689.00

Hidden Costs = $17,386.52

---

* All costs are based on the estimated real costs (16.58 per hour) to operate a rear-packer garbage truck hourly in FY-78 as shown in Table ___.

** All costs are based on the paid hours for solid waste collection as shown in Table ___.

TABLE 6

(TONS)
ESTIMATED AMOUNTS AND COSTS OF SOLID WASTE
COLLECTED IN FY-78 IN SILER CITY

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Total Cubic Yards
Commercial	13	13	13	13	13	13	78
Residential	25	25	0	25	25	0	100
TOTAL	38	38	13	38	38	13	178 cubic yard per week

Commercial

78 cubic yards x 400 lbs ÷ 2,000 lbs = 15.60 tons weekly
15.60 x 52 = 811 tons annually
811 ÷ 12 = 67.58 tons monthly
$2,873.87 ÷ 67.58 = $42,54 per ton

Residential

100 cubic yards x 400 lbs ÷ 2,000 lbs = 20 tons weekly
20 tons x 52 = 1040 tons annually
1040 ÷ 12 = 86.66 tons monthly
$2,299.08 ÷ 86.66 = $26.53

Residential and Commercial Cost

2,299.08 + 2,873.87 = $5,172.95 per month (average cost
5172.95 ÷ 154 tons = 33.59 per ton monthly (average cost)
62,075.52 ÷ 1851 = 33.53 per ton annually

NOTE: The actual amount of cubic yards of garbage collected is based on information provided by the town manager. Approximately 38 cubic yards of residential and commercial garbage is collected daily in Siler City.

One cubic yard of garbage that is well compacted equals approximately 400 pounds.

Analysis of Collection Cost

The cost and productivity tradeoffs faced by a city official or private contractor in operating a collection system are complex. Preceding papers have attempted to deal with subsets of these tradeoffs on an issue-by-issue basis, e.g., point of pickup comparisons can be made by holding all other variables constant and comparing the difference in curbside and backyard collection.[1] This analysis discusses Siler City's overall collection cost, identifies the key factors which should be examined for the collection operation, and compares Siler City results with those of an EPA study on cost and productivity of systems in eleven (11) national cities.

Trash and leaf collection costs are omitted from this study because those costs are based upon a seasonal and request basis which is not particularly significant to this analysis.

Considering that Siler City has a municipal solid waste collection system which demands supervision and some general management attention, lowering current costs and increasing overall productivity are the objectives which this study seeks to identify.

Based on information presented in the preceding tables, one can begin to better understand the real costs associated with solid waste collection in Siler City. There are eight key factors which should be examined for every collection operation.

Equipment:

- Depreciated vehicle procurement cost
- Maintenance cost
- Consumable items
- Miscellaneous costs (e.g., insurance, license fees)

[1] Decision-Makers Guide in Solid Waste Management, Environmental Protection Agency, Second addition, 1976, p.151.

Labor:

- Wages
- Fringe benefits

Overhead:

- Management and administrative overhead
- Office and garage rental, utilities and supplies, etc.

Residential Cost Analysis

Currently, residential collection costs in Siler City are based on 1200 residences that receive twice weekly curbside pickup. (Curbside pickup, twice weekly is considered by the Solid Waste Industry to be one of the highest levels of service that a resident can receive). Based on information provided by the Siler City manager, it was determined that an estimated thirty-two (32) hours a week are being allocated for residential garbage pickup and disposal. The residential costs presented in Table ___ are based on this amount of time. The estimated monthly costs to deliver municipally operated garbage collection to 1200 residences is $2,299.08 monthly or an average of $1.91 per residence per month. On route collection time is calculated to be 4.5 hours per day, four days a week. Two point five (2.5) hours per day are provided for pickup of light commercial garbage. Combined pickup in Siler City is utilized for four days a week. The workers are paid on an eight-hour basis, but actually work less because the town uses the task incentive system, (e.g., the crew can go home when its route is complete) thus cutting down on the amount of on-route collection time per day.

The task system used in Siler City appears to be cutting productivity in half, because the crew has a designated route that has approximately 300-325 residences. To increase productivity, the designated routes need to be extended.

The estimated cost to service 1200 residences annually is $27,589 or approximately $23.00 per home per year. For twice a week garbage pickup, $23.80 is considered to be below current national price standards which is _____. Table __, the most recent data available comparing eleven (11) residential collection systems nationally, indicate that productivity and cost for the Siler City system should compare somewhat with the output shown for System 9 (three-man, curbside, 20 cubic yard rear loader and task incentive). Note that the total cost per home per year in 1973 was $24.96 utilizing twice a week curbside pickup with a three-man crew. Therefore, from a cost standpoint, the Siler City residential cost appears to look favorably considering that cost have risen drastically since 1973.

On the other hand, cost per ton tends to evaluate productivity. In 1978, it costs the town of Siler City $26.53 per ton for residential garbage pickup. This figure is well above the $14.67 figure that is reflected for the Florida community (System 9) in Table __. However, one must keep in mind that many variables such as topography, weather conditions, condition of equipment and so forth affect productivity. Data from Table __, System 9, is only used as a comparison because other current data on similar systems were not readily available.

From a cost viewpoint, Siler City's garbage crews are not being very productive when compared to an urban, high volume system such as Raleigh, N.C. which utilizes rear-packer trucks with four and five man crews in some residential areas. It cost the City of Raleigh $25.00 per ton to collect and dispose of residential garbage. Whereas, in Siler City, with a lower volume of garbage, $26.53 per ton is considered to be high.

While it is difficult to make national comparisons based on cost because of the wide variations and the many variables that are affected, broad ranges can be determined.

Ranges of Cost Elements

The typical annual costs for two and three-man crews working with a 20 cubic yard rear loading vehicle have been estimated in Table ___ below. Siler City utilizes a 1971 and 1976 model 20 cubic yard rear loading vehicle with two three-man crews.

TABLE 7

TYPICAL YEARLY COLLECTION COSTS FOR 2- AND 3-MAN CREWS, INCLUDING VEHICLE, 1975

Cost elements	2-man crew	3-man crew
Depreciated vehicle procurement cost*	$6,900	$6,900
Maintenance cost	4,000	4,000
Consumable items:		
Fuel (6,065 gallons x $0.36)	2,180	2,180
Oil	480	480
Tires	1,680	1,680
Miscellaneous (insurance, fees)	3,000	3,000
Labor, including 20 percent fringes:		
Driver ($5.00/hour)	12,480	12,480
Helper(s) ($4.50/hour)	11,232	22,464
Management and administrative overhead (30 percent of direct labor)	7,114	10,483
TOTAL	$49,066	$63,667

*Straight-line depreciation over 5 years at 6 percent interest. Vehicle is 20-cubic yard rear loader.

The above ($63,667) cost for operating one three-man crew is slightly higher than the estimated combined collection cost for Siler City in 1978 ($62,075). An opinion is, labor costs are much higher in this typical 3-man crew operation. More than likely, the above typical costs are from an urban area in the northeastern United States where operating costs are much

due to many factors such as the cost of living, climate, and population density.

Clearly, labor costs (including fringe benefits) account for the largest portion of the total collection cost (.54 percent). Table __ figures indicate that labor costs in Siler City are approximately 60 percent of the entire operating budget. It can also be determined from an analysis of Table __ that residential collection costs in 1978 ($27,589) represented 44 percent and commercial costs ($34,486.40) represented 56 percent of the estimated actual costs spent. Hidden costs, $17,386.52 represent approximately 39 percent more than the actual budgeted amount of $44,689 that was accounted for in 1978. Using these estimated cost figures for residential collection in Siler City in 1978 and comparing these same figures locally or nationally, operating officials can begin to identify deviations in their costs. Since many of these costs vary from city-to-city, each city should derive its own data base for cost factors wherever possible.[2]

Commercial Cost Analysis

In FY-78, commercial garbage collection costs in Siler City were based on approximately 125 businesses, that qualified for pickup six days a week. There is reason to believe that the 125 businesses is a conservative figure, thereby indicating that commercial cost are even higher than anticipated or estimated. The commercial cost analysis in this study is based on forty hours of paid work time that was estimated to be allocated toward commercial pickup. All costs are based on hourly costs (used in this study) to operate a rear-packer truck and the estimated number of paid hours weekly.

The estimated monthly costs to deliver garbage service to 125 light commercial businesses was $2,873.87. To service one account monthly, it cost

[2] Ibid, p.151

the town $23.00 per account. Annual costs are estimated to average $34,486.40 or $276.00 per account.

In 1978, it cost the town $42.54 per ton to provide service to 125 commercial accounts, six times a week, utilizing two three-man crews. In Raleigh, the cost per ton for commercial service in 1978 was $16.58 or slightly more than one-third the amount that it cost to pickup in Siler City. An analysis between Raleigh, an urban city with over 200,000 population and Siler City, population approximately 5,000 appears meaningless, but data for Raleigh was readily available, therefore the figures were used to provide one type of comparison based solely on cost per ton. The following table outlines typical yearly costs for commercial collection with rear loader and two-man crew. Costs are for a 20 cubic yard packer that is manually loaded. Average compacted waste density is 500 lbs./cubic yard, and two loads are collected each day.

Figure: 20 cubic yard body x 500 lbs = 10,000 lbs. or 5 tons;
5 tons x 2 trips/day = 10 tons per day;
10 tons/day x 260 days = 2,600 tons per year

TABLE 8

TYPICAL YEARLY COSTS FOR COMMERCIAL COLLECTION WITH REAR LOADER AND 2-MAN CREW*

Item	Cost Per Year
Truck cost ($30,000 at 6 percent interest amoritized over 5 years)	$6,900
Labor, including 20 percent fringes:	
Driver ($5.00/hr)	12,480
Helper ($4.50/hr)	11,232
Consumables:	
Fuel (7,200 gallons x $0.36)	2,592
Oil	480
Tires	1,680
Truck Maintenance	4,000
Management and administrative overhead (30 percent of direct labor)	7,114
Miscellaneous (insurance and fees)	3,000
TOTAL	$49,478
$49,478 ÷ 2,600 tons/year = $19.03/ton	

For the rear loader, it is assumed that a two-man crew manually collects two loads a day, 5 days a week, working 8 hours per day. On this basis, the estimated total yearly cost, including the cost of the truck, labor, overhead, maintenance, fuel, insurance and licenses, would be $49,478 or $19.03 per ton.

TABLE 9

TYPICAL YEARLY COSTS FOR COMMERCIAL COLLECTION WITH FRONT LOADER AND DRIVER-OPERATOR*

Item	Cost Per Year
Truck cost ($50,000 at 6 percent interest amoritized over 5 years)	$ 11,500
Driver's wages and 20 percent fringes ($6/hr)	14,976
Management and administrative overhead (30 percent of direct labor)	4,493
Truck maintenance	10,200
Fuel (8,400 gallons x $0.36	3,024
Insurance and licenses	4,800
TOTAL	$48,993
$48,993 ÷ 4,940 tons/year = $9.92/ton	

To estimate costs for a front loader, the following assumptions were made: 2.5 loads per day, 5 days a week, and 8-hour work shifts; an average of six containers are emptied per hour; the average container size is 6 cubic yards; the body capacity is 30 cubic yards, with a 4:1 compaction ratio; and the average weight per compacted cubic yard is 500 pounds. The initial investment in the storage containers is assumed to be covered by a rental fee or sale to the users. On this basis, the yearly operating cost is $48,993, or $9.92 per ton.

Summary of Cost

If a community has commercial solid waste to collect, a thorough analysis has to be made to determine which collection system is best suited to its needs. The volume of commercial solid waste is the main criterion. Without sufficient amounts of wastes to justify purchase of a commercial system, it would be more cost-effective to collect the commercial waste with the residential collection equipment. Unfortunately there is no rule of thumb for deciding when a switch in collection methods should be made. It is simply a matter of which system or combination of systems is the most cost-effective for each community, and this can be determined by cost accounting.

The system to be utilized is dictated by several important criteria in addition to waste volume and cost-effectiveness. The service area must be surveyed to assure that the equipment can be safely used on the roads, streets, and alleyways without damage to structures or equipment. Other facts include the type and size of storage facilities needed and distance between the service area and the disposal site. The wishes and reactions of users of the service and the collection workers must be given careful consideration in the decision-making.

A Guide to Determining Productivity Measures in Siler City

Cost constitutes only half of the decision-making factors in evaluating a collection system. Productivity is the other side of the ledger, and an operating manager must attempt to balance the two sides.

Several indexes have been developed to show system productivity. Some of these are: services/day/truck, services/man/hour, tons/day/truck, and tons/man/hour. As can be seen from these measures, crew size, tonnage collected, and time to collect are elements in achieving high productivity.

Results of a study comparing the productivity and costs of nine curbside and two backyard systems with different equipment types and crew sizes (Table ___) is presented in this study as a comparative guide. Overall, three-man crews proved to have a significantly higher cost. Both the cost/home/year figures and cost/ton figures should indicate that this average weight per service directly affects the number of services a crew can collect.

The first section of the table describes the systems being evaluated. Note System 9 is the identical type of a system used in Siler City (see preceding text on existing system in Siler City). The next section shows on a percentage basis how the total man-hours of the crew are distributed among activities. This section should prove valuable in comparing productivity of how the crew spends its time on various activities. In Siler City, time spend on various activities has not been analyzed, but this section of the table should prove helpful to the sanitation director to help assess the on-route productivity of his crews. Next is a summary of how much of the crew time is spent on productive activities: those activities which must be performed to pick up the waste and haul it away. Transport, for example, is productive time for the driver but not for the collectors, which penalizes the larger crew sizes. Collecting, driving, riding, walking, and compaction times are considered as productive times. Waiting and other time are nonproductive.

Since many variables affect crew performance, the next section is provided to enable better comparisons. For example, an important determinant of collection time for curbside pickup is the percent of one-way storage (bags and miscellaneous) items versus cans. In Siler City, the majority

percent of the curbside pickup are cans, which means more collection time returning the cans to the curb.

The next section shows how productive the crews are on the route in terms of services per man-hour. These two variables must be considered jointly, although the amount of waste tends to be the major determinant.

Based on information provided by the Siler City Sanitation Director, it was determined that one three-man crew picked up approximately 300-325 houses per day. Collection time allotted for residences was calculated to be 4.5 hours of the normal 6.5 hours of collection time. Data presented in Table ___ for System 9 indicate that a three-man crew in this particular residential study was averaging 200 residences per hour. In Siler City, based on 300-325 pickup per crew daily on a 4.5 hour basis, the collection crew is only picking up sixty-six (66) residences per crew. This amount of productivity is well below the expected production output of a three-man crew. In fact Table ___ indicates that one crewman picked up garbage from 66.5 homes per hour in this particular Florida community. (Note: An interesting point to cite concerning twice weekly residential collection is systems with twice-a-week collection are primarily in the Southern (especially southeastern) States and account for approximately 45 percent of the urban systems. A higher level of service rather than more efficient crew production times seems to prevail in Siler City's case.

Considering that the amount of waste collected is a major determinant in assessing productive output of a crew, a local program manager, with the Systems Management Division of the U. S. Environmental Protection Agency was contacted to provide some technical assistance with Siler City's garbage system. The following analysis was provided to help analyze the problem.

SECTION IV

BROAD ORGANIZATIONAL OPTIONS

(What's Available to the Local Manager)

"Residential collection based on 1200 residences, that will average about 55 pounds each per week, total waste collected should be about 33 tons per week. Since most of the waste is placed on the lot line the first of the week, calculate about 7 tons per day on Monday, Tuesday, and Wednesday and 4 tons per day the last 3 days of the week."

The national average per 3-man crew per day is about 10 tons from 400-450 residences. "There is no reason why Siler City cannot utilize one 3-man crew and achieve the same productivity in 4-4.5 hours of on-route collection time as the town is currently getting working a crew 6.5 to 7 hours picking up commercial and residential waste".

COLLECTION SYSTEMS

Municipal Collection Collection of solid wastes directly by a public agency, using public employees and equipment, under direction of a municipal official in the same manner as for other public functions such as street cleaning, sewer maintenance and pavement repair. Municipal collection includes public utility collection--a public corporation, authority, cooperative, or special district which usually serves more than one municipality and is financially self-supporting with its own administrators, equipment, etc.

The municipal collection system as described has advantages and disadvantages from an overall managerial perspective. This perspective must, of course, take account of noncost-benefit factors (public relations aspects of municipal operations, responsiveness of the municipal administration to citizen comments on the collection service, obligations as an "employer of last resort", etc) that are endemic to any public sector operation and make precise comparisons with the private sector difficult.

Advantages

-benefits stemming from the absence of the need to make a profit or to pay taxes;

-ability (especially of larger municipalities) to buy trucks, etc. at price advantages;

-likelihood of a prompter response to citizen complaints;

-protection of public health as a primary goal;

-advantages of municipal merit systems in providing qualified employees;

-possibility of lower operating costs if there is efficient administration;

-possibility of long-range planning and maintenance of continuous records through continuity of operation;

-possibility of transfer of equipment and personnel from other municipal operations in such emergencies as cleaning up after storms;

-all details of control and administration remaining within the operating agency.

Disadvantages

-severe lowering of efficiency and standards when political influences (particularly patronage appointments) prevail;

-insistence by councils and officials on short-term cheapness (inadequate salaries, failure to replace ailing equipment) rather than long-term economy;

-excessive costs of extra service to complainants;

-problems in removal of inefficient employees and in making fullest use of the labor force;

-inability to embark on perhaps risky salvaging operations.

Contract Collection Collection of solid wastes by individuals or companies under formal agreements with the responsible government agency. The agency pays the contractor from general public revenues or from service fees collected by the agency. Contracts are usually awarded on a competitive basis to the lowest responsible bidder who must furnish a performance bond.

Advantages

-possibility of less political influence in the management and operations of collections;

-likelihood of more efficient and economical performance in contrast to the municipal system in a given jurisdiction;

-maintenance of equitable services to all properties and avoidance of extravagant services;

-determination of collection costs by the contract, thus facilitating fiscal planning;

-lowering of costs by the use of salvage operations.

Disadvantages

-a danger that contracts may be awarded in return for political support, rather than on a cost-efficient basis;

-the danger that public health considerations may be sacrificed to profit;

-unwillingness on the part of the contractor to respond to complaints;

-cost of constant inspection functions performed by the municipality;

-limited span of contracts that may induce excessively short amortization costs for equipment;

-difficulty of developing specifications that cover all eventualities;

-contractors that may be forced to cut corners when faced by unanticipated financial difficulties;

-the limiting of the number of reliable contractors;

-increased contractor profits that may result from savings from technological innovations, rather than being passed on to the public.

Franchise Collection

The distinction between franchise collections and other private or contract collection is sometimes not entirely clear, and a number of definitions may be in use. The estimate of Solid Wastes of the American Public Works Association (APWA) states: "Private collectors often operate under city licenses or franchises. Municipal regulation may be extensive or may be confined simply to enforcing general public health and nuisance ordinances..... Where an individual collector or company is granted an exclusive privilege to conduct the solid waste collection business for an entire city and has a formal contract or franchise with the municipality, there is some confusion as to classification. The significant point of distinction is not that a contract or franchise is in force, but that the collector is paid by his customers--not by the city--for the service rendered."

Advantages

-When a single business enterprise conducts a collection service for the community, such operations are comparable to those of privately-owned utilities operating without competition under franchise. There is thus a case for some kind of municipal regulation of the prices or service involved because there is no competition;

-The license fee or franchise fee may therefore be fixed at the amount necessary to regulate the service provided or higher.

Private Collection

Collection of solid wastes by individuals or companies from private properties, the arrangements for which are made directly between the occupier of the premises and the collector. Often such collections are as regular and as systematic as municipal and contract operations, but in some cases the private collector conducts his business on the basis of individual orders.

Advantages

-Private collection can fill an important role in taking care of certain kinds of property or certain classes of refuse when no publicly-managed or financial systems are in operation.

-Some cities may assign private collectors to specific routes.

Disadvantages

-Operators concerned may be selective in their clientele because of greater profit opportunities in some areas; from a community-wide standpoint, this can be a drawback because unserved areas or neighborhoods may occasion health hazards that affect everyone.

Optimum Arrangements

There are so many variables present in considering which system is the best solid waste collection system for any particular jurisdiction that no definite answer can be given in an outline survey such as the material presented in this chapter. In such situations, the quality of the management practices adopted, rather than any abstract calculation of the presumed benefits of either public or private sector procedures, may be the determining factor.

Ordinances and Regulations

The ordinance spells out the precise aspects of powers and duties of the administrative department; permits for the management of solid waste;

powers and duties of the enforcement agency, the solid waste management board, etc.

From the managerial viewpoint, should, for example, organizational responsibility for solid waste management be assigned to a unit within a public works department or to a separate unit in the local government? The National Association of Counties sums up the situation as follows:

Advantages to Having a Separate Organizational Unit

-a separate budget

-more visibility to the public and elected officials

-total attention devoted to the problem

-no sharing of equipment and personnel

-direct responsibility to the elected officials

-higher priority status

Disadvantages

-further fragmentation of local government

-lack of coordination with related programs

-duplication of certain types of personnel (e.g., budget, research, accounting).

Irrespective of the precise mix of public and private agency involvement in the solid waste program of a community, the ordinance should place heavy emphasis on the importance of a solid waste management system that carries out a managerial plan intergrating the various operational and administrative elements involved. Such a plan is the responsibility of the director of the administrative department involved, working in coordination with other units of local governments (comparing practices in other comparable communities to help stay abreast of current cost effective procedures) and the private sector.

SYSTEM IMPROVEMENT STRATEGIES

The following analysis takes a much more specific look at key points in the solid waste management process--at what might be termed system improvement strategies.

The topics covered are point of collection, frequency of collection, routing, use of bags, mechanized systems, crew size reduction, safety, equipment, and combined collection.

Point of Collection

The point of collection can play a major role in reducing collection costs. Pickup from the curb is by far the most economical practice but it is also the hardest to implement. Another interesting point is the fact, "that the question of curbside collection poses difficulties from the managerial viewpoint".

From the collection work force perspective, there are clear savings in curbside collection. "Not only can one to two persons be eliminated from each crew (e.g., some curbside systems utilize a one-man crew; some utilize a two-man crew, depending largely on the type of vehicle used in the system; Siler City has curbside collection which utilizes a three-man crew, a driver, and two loaders; wherein, some curbside systems utilize one man as a driver and a loader), but safety is also improved with fewer industrial accidents occurring. This can translate into reduced insurance premiums. From the viewpoint of the personnel concerned, the strain of lifting heavy containers and, not least, the dangers of dog bites (associated mainly with backyard collection) are also eliminated. The advantages and disadvantages of curbside, alley, and backyard are presented in summary form in Figure __ below.

Figure 1

Alternatives	Potential Advantages	Potential Disadvantages	Conditions Which Favor Alternative
Curbside/ alley	More efficient Less expensive	Cans at curb look messy Special arrangements must be made for handicapped and elderly	High collection costs Unwillingness on part of residents to pay higher taxes or user charge
	Requires less labor	Residents must remember day of collection	
	Facilitates use of paper or plastic bags		
	Reduces collector injuries		
Backyard ...	No effort required by residents	More expensive High labor turnover	Quality of service provided more important criterion than economics
	No mess at curbs	Increases number of collector injuries	

Potential advantages and disadvantages of curbside/alley and backyard collection with the conditions that favor each. (Source: Robert A. Colonna and Cynthia McLaren, Decision-Makers Guide in Solid Waste Management, U. S. Environmental Protection Agency, Report No. SW-127).

Based on the above advantages and disadvantages of each system and the conditions which favor each alternative, the curbside system already being used in Siler City is perhaps the most cost efficient of the three for the town. However, there are some major collection alternatives that may be implemented with the curbside system which may create an even greater cost efficiency. These alternatives will be discussed in detail in the section of this study on alternatives available and their estimated costs.

Frequency of Collection

Because of the potential health hazard from putrescibles, collection frequency is naturally a prime managerial concern. One report on the subject states:

> The minimum acceptable frequency of collection for residential wastes containing putrescibles is once a week....(more generally). There are the acceptable choices of collection frequency: once a week, twice a week, and more than twice a week.

In a report by Bartollotta, statistics cited indicate that 40 percent of 539 cities responding have twice a week collection and 53 percent once-a-week collection. There are clear cost associated with varying frequencies of collection. Obviously, once-a-week collection is less expensive, particularly in times of escalating fuel bills, although failure to collect on a more frequent basis may, under some circumstances, lead to a health hazard. The advantages and disadvantages are outlined in Figure __ below:

Figure 2

Alternatives	Potential Advantages	Potential Disadvantages	Conditions Which Favor Alternative
Once per week...	Less expensive	Improperly stored waste can create odor and fly problems	Adequate storage provisions
			Cold to moderate climate
	Requires less fuel		
Twice per week..	Reduces litter in urban areas	More expensive	Quality of service provided more important criterion than economics
	Reduces storage volume requirements	Requires more fuel	
			Warm climate
More than twice per week	Reduces storage volume requirements	More expensive	Seriously restricted storage space
		Requires more fuel	Dense population
	Reduces litter in urban areas		

Potential advantages and disadvantages of different frequencies of collection, with the conditions that favor each (Source: Same as Figure __).

In an effort to compare Siler City's current frequency of collection with that of some other possible alternatives, many conditions must be analyzed objectively, but one disadvantage has become paramount. That is the fact that the availability of fuel as well as escalating costs will create a new dilemma (problem to be resolved) for managers and administrators of solid waste systems to cope with.

Further detail discussion on the frequency of collection will be discussed in a later section on alternatives available to Siler City or any local unit of government utilizing similar collection techniques.

Routing

The management techniques to be used in planning the best routing system to use in a given community can range from sophisticated mathematical calculations to the application of a heuristic (that is, manual feedback, rule-of-thumb, experience-oriented) approach to problem solving. Utilizing the latter method, an Environmental Protection Agency publication draws attention to three approaches to solid waste collection vehicle routing: macro-routing, districting and route balancing, and micro-routing. They are defined as follows:

Macro-routing determines the assignment of daily collection routes to existing processing and disposal sites. The objective is to optimize the use of processing and disposal facilities in terms of the daily and long-range capacities and operating costs of the facilities, while minimizing thr round-trip haul time (and hence to hauling cost) from the collection routes to the processing or disposal sites.

Districting and route balancing determines a fair day's work and divides the collection crews into balanced routes so that all crews have equal workloads.

Micro-routing looks in detail at each daily collection service area to determine the path that the collection vehicle should follow as it collects from each service on its route. There are clear cost benefits associated with micro-routing, in particular when it is realized that any time saved in reducing route distances and travel times (e.g., by minimizing such "dead" segments as those that have no services or by minimizing U-turns, rush hour collections, etc.) must be cumulative because of the repetitive nature of the functions performed. Certain commonsense rules apply (e.g., routes should be geographically compact, should start as close to the garage as possible, should avoid rush-hour main streets, and should have higher elevations at the start of the route to avoid unnecessary wear and tear on the vehicle, etc.)

Quite often, systematic studies of this kind may not have been carried out in a community for several years, if ever--particularly if the community is a small one. Even in larger communities, such studies should be carried out frequently if the community is a growing one.

Use of Bags

Because plastic and paper bags are easier to handle than cans, particularly for residents in the case of curbside collection and also because they are less noisy, more sanitary, and less liable to cause injury (e.g., compared to the ragged or rusted edges of cans), they have become increasingly popular in recent years. Their use can also "reduce collection time by twenty to fifty percent which translates into considerable savings on manpower costs." Bags must of course be strong, appropriately sized, and easily closed when filled. They may be purchased directly by the citizen or supplied by the city for a fee or free. It is often held that the bags can be ripped open easily by dogs, stray or otherwise, thus adding to health hazards, especially in crowded inner-city environments. Determined animals, however, are quite capable of

Crew Size Reduction

As one mid-1970 survey of the topic points out: "When salary, fringe benefits, overhead and insurance premiums are taken into account the reduction of one person can result in savings of $20,000-30,000 a year. One person operations, for example--a distinct productivity advance on three or five person collection--can be introduced efficiently in cooperation with union representatives if the sanitation workers concerned are transferred to other departments while the single operator is given a pay increase commensurate with the increased responsibility.

Safety

In considering system improvement strategies, it is always a temptation to concentrate on the engineering aspects of the situation. One basic human factor involved, however, is the need for improved safety.

The solid waste industry has one of the highest injury frequency rates in the nation.

How can hazards be reduced? Apart from such innovations as mechanical collections, there are many safety practices that can be implemented on even the most old-fashioned collection operation. The National Safety Council bluntly faults bad management practice in the failure to implement good safety programs. From the managerial perspective, correct procedures for physical examinations, training, equipment design, safety incentive programs with cash awards, and other dimensions of a good safety program assume administrative importance commensurate with the high accident rates cited. No manager can run an efficient collection operation without a well-designed safety program as one of its basic components. If managers fail in this respect, inspectors from the Occupational Safety and Health Administration (OSHA) may well remind them of their responsibilities. Does your collection system have a well-designed safety program?

tipping over garbage cans. Strict leash laws and not putting out bags overnight may help to solve the problem as far as bags are concerned. A capsule of ammonia placed in a bag has also proved to be effective deterrent to animals.

Mechanized Systems

One tremendous source of possible cost saving is the use of a mechanized collection system of some kind. The following mechanized systems are now being used widely by many communities: The Rapid Rail loader is a device which is easily attached to any standard side loader and is capable of automatically picking up and emptying standard containers of polyethylene which come in 90 and 300 gallon sizes. The entire cycle takes 10 seconds.

In addition to such obvious benefits as reduction in personnel and elimination of possible injuries in manual lifting operations, there are clear cost-benefits if one person can pick up from 750 families per day (90-gallon containers) or from 1,800 families per day (300-gallon alley containers).

Possible disadvantages might include problems with parked cars and potential high maintenance costs because of the complex electrical and hydraulic systems involved.

The Mobil Toter system utilizes a wheel-out 80 gallon container (brought to the curb by residents) which are then positioned by the collectors onto one or two automatic lifting devices attached to the collection vehicles (rear loader, side loader, EVO-unit). The mobile toter is safer to use, cleaner, requires less handling, and has a more pleasing appearance.

methods of dealing with bulky item collection which are outlined in the Urban Public Works Administration, Municipal Management Series, under the Solid Waste Management section on page 439.

The selection of the method of bulky item collection must be based on the characteristics of the solid waste collection system (crew size and truck type) and the nature of the area being served (inner-city or suburban, and income level). In any case, it is a service which must be provided.

Summary

The preceding discussion has taken a number of elements in the operational processes of the solid waste collection system and taken a look at them with the aim of highlighting those decision-making areas--involving human as well as engineering considerations--likely to concern the local government manager dealing with this subject. These systems improvement strategies have related to point of collection, frequency of collection, routing, use of bags, mechanized systems, crew size reduction, equipment, and combined collection. It should be emphasized that the points made in the discussion must always be considered against the background of a particular community, its size, characteristics, and local government organizational and managerial structures. For more detailed treatment of the technical and organizational matters involved in this changing field, the reader is referred to the manuals cited and to the bibliography.[3]

[3]William E. Korbitz, et ul., eds., Urban Public Works Administration (Washington, D. C.: International City Management Association, 1976), Solid Waste Management, 427-439.

Equipment

Equipment represents a long-term capital investment. A report on the subject states, "if equipment is not carefully matched to local operating conditions, employees cannot be used effectively. Delays and downtime resulting from defective, aging, or poorly maintained equipment can mean a loss of valuable man hours as well as equipment time. Effective equipment selection, purchasing, maintenance, and replacement are essential to an economical and productive residential collection operation."

Equipment selection has become a difficult task with recent technological innovations. The equipment available for making solid waste collections include standard side or rear loaders which are manually loaded or used in conjunction with satelite vehicles; side or rear loaders with partially or fully mechanized loading devices for cans, bins, or bags; front-end loaders for use with walking crews or satelite vehicles; and side loaders with detachable bodies.

Local operating conditions affecting the choice of equipment range from the level of service (point and frequency of collection) and the type of storage containers and their number and accessibility at each stop to geographical (topography, wind and temperature extremes) and waste material related (dimensions, hazardous properties) characteristics.

Managerial considerations involved in the replacement decision will touch on such variables as depreciation, trade-in value, and finance charges (all of which tend to decrease over a period of time), as weighed against repair costs and downtime factors, which increase over the equipment life.

Combined Collection

Are there productivity gains to be made by combining collection of bulky items with usual solid waste collections? An EPA study points to four possible

SECTION V

PROPOSED ALTERNATIVES

"A good time to make changes in crew size is with the expansion of service or change in equipment. The number of men on a crew clearly must be related to the type of equipment in use and the actual difficulty of the job."

A. Retain the Existing System (realizing the operating costs of an old system)

Problems/Assumptions of the Existing System.

The Existing System is a potential health hazard.

e.g. -there exist open garbage storage containers or areas (concrete bins)

-the crews are required to manually handle the garbage in order to remove the garbage effectively

-injury rates are higher than with another system which requires less handling

Remedy

-remove the open concrete bins in the CBD.....2 men (40 hours) @$3.00 per hour

$240.00
60.00 tools (misc.)

$300.00

-modify the ordinance to require that all merchants purchase the required containers for a safe and effective garbage system.....an initial cost to the town that can be recovered

$

-plan and implement a new safety program that will or should improve employee morale and better labor relations ..... $ No cost

-an improved existing system will help beautify the community ..... $ No cost

-a new improved existing system could possibly stop the transmittal of unrecognized germs contacted by the collection crews to other members of the community ..... $ No cost

TOTAL COST .....

The existing system does little for the sanitation employee as a worker, resident and a citizen.

e.g. -the existing system degrades the personnel by requiring that he remove the garbage manually from unsanitary pit-like conditions.

-wages are low

-the existing system attracts the uneducated and sometimes apathetic type worker

-insurance cost are high to the town

-the existing system does not make the cleanup of solid waste a more pleasing type of a job as do some of themore mecahnized systems, thus decreasing morale

-the employee justifiably rushes through his daily task toward completion with disregard toward cleanliness and overall community appearance

-the existing system provides for grumbling and an otherwise pessimistic employee attitude toward the job, which assuredly affects the overall performance

Remedy	Estimated Cost
-require that all the commercial accounts adhere to the new ordinance requirements for a standarized container system. (see suggested ordinance modifications for information on the proposed standarized containers and requirements).....	the initial cost for the town to purchase the necessary containers is $ (payment plan)
-increase wages based on the system modifications that will be implemented (see the personnel cost analysis on proposed system modifications)	$ (monthly cost)
-system modifications will attract and retain the good employee who has more pride in his job.....	$ No cost
-system modifications should emphasize, more so, the standard work day method with task as an incentive, which would increase productivity.....	$ (monthly cost)
-employee morale and attitudes may improve with system modifications	$ No cost
	TOTAL COST.. $

The existing system is not very cost effective

e.g. -there exist an estimated cost of $17,386.00 over the actual budgeted amount in 1978, that are hidden costs which are being paid by the town; these hidden costs are 38 percent of the actual budgeted amount that was spent in FY-78 (see Table __)

-there exist, escalating fuel cost; the town operates a 1971 rear-packer which is not cost effective from a practical standpoint as to fuel usage. Fuel cost are still rising and diminishing nationally

-the system now operates a (six-day weekly) commercial pickup method that is not very cost effective, considering that a containerized system would require less fuel usage because of less pickups weekly.

-the existing system is presently getting an average 6.5 hours of work time from the crews daily. On-route collection time is severely hampered due to time spent manually picking up light commercial accounts

-some commercial accounts do not generate enough garbage daily to qualify for everyday pickup

-commercial collection costs are high (see Table __)

-residential collection costs are hgih (see Table __)

Remedy	Estimated Cost
-proposed modifications will reduce the hidden costs substantially if they are determined feasible	$
-the old 1971 rear-packer truck can be used as a backup to a one crew approach or it can be replaced and equipped at a cost of approximately....	$30-35,000
-a containerized collection system for the light commercial accounts could reduce pickup to a fixed schedule, which can control operating costs...	$
-on-route collection time for Siler City's garbage collection should separate collection times for residential and commercial (see recommended modifications)	$ No cost
-commercial accounts that do not generate enough garbage to justify a container should be studied more closely by the DPW supervisor to ascertain needs	$ No cost

-alternatives and recommendations suggested by this study, if adopted, will decrease operating costs for the Siler City system..... $ No cost

TOTAL COST ..... $

B. Retain the existing system with modifications for increased efficiency

Proposed system modifications - Alternative #1

Residential: Retain the present curbside collection system (twice weekly) with increased on-route collection time, due to less time required in the collection of the commercial garbage.

Commercial: Require all commercial establishments to purchase the necessary containers (1-8 yds.) that are required in the current ordinance; this requirement would facilitate the removal of the concrete bins from the CBD; improperly stored garbage would be readily identified in other areas of the town also.

Equipment: Purchase a new garbage truck to replace the worn out 1971 Garwood rear-packer; the new garbage truck could possibly be a rear-loader or side loader, preferably 20 cubic yards or more. If the new truck is a rear-loader, a winch would be needed for the commercial accounts that would be required to buy the necessary containers that are 1-8yards in volume. The town would buy the containers and resell them to the merchants with high volume.

Personnel: Retain the existing method which uses two three-man crews; increase the current hourly wages in line with present cost of living indicators; the town should attempt to make the job collecting the towns garbage more meaningful as a job (see remedies).

Ordinance: The town should enforce the ordinance requirements more stringently. Constant violators should be written a citation, possibly by the drivers or the sanitation supervisor.

Proposed system modifications - Alternative #2

Residential: Go to once-a-week pickup or retain the twice-a-week curbside residential pickup would require that the town purchase some new collection equipment (see equipment below). Then one crew could pick the town up in quarters on Monday, Tuesday, Thursday, Friday or retain the existing twice-weekly service

Commercial: Mechanize the existing commercial pickup; require that all merchants purchase the necessary containers that are needed to guarantee compliance with the ordinance. The containers can be either metal or plastic. The commercial pickups would be on Wednesdays (task) and Saturday mornings.

Equipment: To effectively go to once a week residential pickup in Siler City the town will need to mechanize their existing commercial system; that is, the town would have the option of purchasing the following equipment: the large 90 gallon plastic containers; the larger 300-gallon plastic containers; the mobile toter (roll-out 80 gallon containers); 1-8 yard metal containers that can be used with a winch device (cables attached to the containers); purchasing the necessary flipper devices that could mechanically empty the roll-out containers on a side or rear-loader truck is an option. There is also a mechanized device called the Rapid-Rail system that is used with the 90 and 300 gallon plastic containers on the side loader trucks that the town would have to purchase.

Once-a-week pickup

The purchase of a new garbage truck can possibly be delayed by equipping the 1976 rear-packer with the necessary equipment needed to modify the system. The old 1971 truck can be used as a back-up, that is equipped with a winch. The flippers would only be needed if the roll-out container system is accepted. The necessary mechanical lifting device would also be needed for the 90 and 300 gallon containers.

Twice-a-week pickup

The purchase of a new garbage truck would be necessary because the old 1971 truck is worn out. Equipping the new truck with a winch device would be needed if the town went to metal containers for the commercial accounts. The flipper devices would be needed if the town went to the roll-out containers. The necessary mechanical lifting devices would be needed for the 90 and 300-gallon containers to be used with the side loading Rapid-Rail system.

Personnel: Once-a-week - curbside residential pickup, twice-a-week commercial pickup. One good rear-loading garbage truck that the town presently owns; one three-man crew with a $1.00 per hour raise for the loaders and an appropriate raise to be determined by the manager for the driver. Increased productivity would be required with the increase in pay.

Twice-a-week - Curbside residential pickup, twice-a-week commercial pickup. Two garbage trucks, (two rear loaders or one rear-loader and one-side loader); they presently own a good rear-loader, therefore only one truck would be needed to replace the worn out one; two three-man collection crews; on Wednesday and Saturdays, only one crew would be needed to pickup the commercial garbage. The other crew can be used in another phase of the Public Works Department if they were working on a 40-hour per week basis.

Ordinance: Ordinance modifications would be needed to require the necessary containers that would be needed for the system modification chosen. Definition of containers and the containers required sections of the ordinance would need to be modified by the town attorney or the town council.

Proposed system modifications - Alternative #3

Residential: Retain the existing twice-a-week curbside pickup or go to once-a-week curbside pickup

Commercial: Contracting Services

The town could possibly purchase the necessary metal containers needed to implement a contractor type commercial collection system on a collection basis that will be determined by the supervisor of public works and the merchants involved. The town will charge the merchants a users fee (e.g. 80% of the collection costs) for collecting the garbage. The town could purchase the containers on a lease-purchase agreement or buy the containers directly on a payment plan. Possibly General Revenue Sharing Funds could be used if they are available.

Equipment: The necessary amount of containers needed to effectively operate the commercial garbage operation in Siler City will have to be purchased or leased. A contractor will have to be hired by the town to pickup the waste. The contractor will bill the town.

Personnel: One three-man crew would be needed for residential garbage pickup; residential garbage can be picked up once a week or twice a week, depending on the system modifications that are chosen; the town could possibly realize a savings in reducing from two crews to one; also the town would only have to operate one truck; and the work week could possibly be cutback for the residential collection system.

Ordinance: The necessary inclusions or deletions would have to m, be made in the ordinance, particularly in Sections 10-2, collection practices; 10-3 containers required; 10-6, points of collection; and Section 10-8, fees.

Proposed system modifications - Alternative #4

Residential: Once a week curbside pickup.

Commercial: Contracting Service

The merchants who need large volume containers could deal directly with a contractor for service. The town would not be involved except for enforcement of the ordinance. Several merchants could possibly share the necessary containers. The merchants who share containers would pay based on the volume of garbage their businesses generated. All commercial establishments would be required to go to a contractor type agreement. The frequency of pickups will be determined based on volume generated weekly. (An option for some outlying commercial establishments that do not generate large volumes of garbage, would be for the town to pickup its garbage if the business was located along a residential collection route).

Equipment: The necessary equipment needed to operate the system using this approach would be: the existing 1976 garbage truck for residential collection; the old truck could be used for a back-up; a contractor would provide the necessary equipment (front-end loader) to pickup the commercial garbage in town.

Personnel: One three-man crew; one contractor

Ordinance: Modify the ordinance wherever necessary.

C. A contractor will provide all of the solid waste collection and disposal in Siler City utilizing the Bid Process (Eliminate the municipal system).

Advantages

-the need for the town to own expensive garbage equipment will be eliminated.

-the sanitation collection crews will be eliminated.

-the sanitation budget will become only an expenditure.

-fringe benefits will be eliminated, thus allowing those funds to be reallocated elsewhere.

-the capital outlay for the sanitation department will be eliminated

-town residents, merchants, and some industries will receive modern garbage collection at a reasonable cost.

-hidden costs will be eliminated

-fuel supplies are diminishing, and fuel costs are escalating

-resource recovery is becoming an acceptable alternative to landfills because of the lack of acceptable land that is required for a landfill operation.

-the town manager can devote the administrative time gained from abandoning the municipal system to other duties.

Disadvantages (refer to the section of this study on contract collection disadvantages)

Some Estimated Costs for the Proposed Alternatives

Alternative #1

-purchase a new truck (rear-loader)	$30,000.00
-purchase two winches @ $1800.00 each	3,600.00
-increase the salaries of the two crew 10% of the hourly pay:	
4 loaders annually	4,193.28
2 drivers annually	2,620.80
	$40,414.08
-the necessary slant top rear loading containers available in 1-8 yards (see Figure __). Cost will be determined based on the size of container needed	$ Cost unknown

Alternative #2

-purchase the necessary containers (see cost of the metal containers for Alternative #1	$ Cost unknown
-purchase the mobile toters @ approximately $40 each; 1200 are needed for existing residential; an estimated 100 mobile toters for some light commercial accounts; 25 mobile toters in surplus	$53,000.00
-possibly purchase the 90 and 300-gallon plastic containers if the town purchased a side loading truck	$
-purchase a side loading truck	$
-purchase 2 flipper devices @ $1800 each to equip both existing garbage trucks	$ 3,600.00

-purchase two winch devices	$
-estimated annual capital saved from eliminating one crew including fringe benefits of 20 percent	$22,464.00
-annual cost for a $1.00 per hour salary increase for one three-man crew with increased responsibilities	$ 6,240.00

Alternative #3

-see Appendix ___ for the necessary containers that the town would need to purchase; the amount of containers will be determined	$
-collection costs at 80 percent monthly	$
-annual salaries for one three-man crew with a $1.00 per hour salary increase for 40 hours per week	$28,704.00
-savings in fuel and operating costs from the old truck	$ Unknown

Alternative #4

-annual savings realized from not operating the old truck	$ Unknown
-annual savings realized from deleting one crew	$22,464.00
-annual savings realized from deleting the commercial pickup service	$ Unknown

SECTION VI

RECOMMENDATIONS

and

CONCLUSIONS

RECOMMENDATIONS

Realizing the high cost that the existing system places upon the community is a major factor that town officials must eventually deal with, therefore, this study recommends that the Town of Siler City, first, begin to modify and update the existing system wherever feasible.

The one change that will have the most beneficial impact on the existing system is removal of the concrete bins in the Central Business District (CBD) and replace them with containers (metal or plastic) which would be in compliance with the town's existing Ordinance on Garbage and Trash. This one change would prove beneficial in cleaning up the collection operation from the purely manual type situation of handling the garbage. The practice of "setting out" garbage would and should be outlawed in Siler City.

In accordance with the existing town ordinance requirements for garbage and trash, it is recommended that:

(1) the Public Works supervisor begin to strictly enforce the existing ordinance to help facilitate the necessary updating that the existing system needs to be more cost effective.

i.e. -outlaw the "setting out" practice of placing cardboard boxes and trash at the rear of building before pickup time

-require that all garbage be stored in containers or bags

-outlaw the practice of throwing garbage and trash haphazardly into garbage storage areas

-include in the ordinance on collection containers, that: should a commercial establishment need more than four (4) thirty-two (32) gallon metal cans, then the business must go to a larger volume container....which would also require the city to mechanize their existing operation to facilitate the large containers. All containers in the town would be standarized

The Town of Siler City have the following options which are recommended for their existing system:

(2) Should Siler City move to a standardized container system for those commercial establishments needing a large volume container, considerable savings could be achieved if the frequency of collection for commercial establishments was cutback possibly to twice-a-week. If the merchants would flatten out the cardboard boxes discarded, the slant top containers shown in Appendix ___ could easily hold several days supply of refuse - with a few exceptions.

(3) Should Siler City move to a standardized container system for commercial collection of at least twice weekly, the city would have to purchase the necessary containers and resell them to the merchants, plus, purchase the necessary winch devices needed to operate a rear-loader container system. Put the winch on the 1976 rear-packer; delay the purchase of a new truck. (see Appendix for the winch device).

(4) It is recommended that if town moves to implement a containerized system for commercial collection, considering the potential for savings, then, the town could operate with one crew which could pick up residential and commercial with increased efficiency. (see the suggested alternatives).

(5) It is recommended that the town seriously consider the fact that their existing system needs some modifications (listed in the alternatives for retaining the existing system) which could be accomplished through a rebuilding program that should be started immediately.

(6) The Town of Siler City has the option of purchasing a new garbage truck and continuing with their existing system considering the high operating cost; escalating fuel prices and fuel shortages.

(7) Should the town decide to modify its existing system, it is recommended that the town hire a contractor to handle the entire collection operation for commercial establishments, which would allow the existing sanitation operation to go to once-a-week curbside collection for the residential pickup. Considerable savings could possibly be realized. The town would not have to spend time administering the collection of commercial solid waste.

(8) It is recommended that the Town of Siler City consider purchasing some front end loading containers and contract out the collection of the waste, charging the merchants users fee (an option).

(9) It is recommended that the town seriously consider the option of purchasing a new truck (possibly a rear-loader with attachments) which is capable of mechanizing and lowering the cost of garbage collection.

(10) The Town of Siler City also has the option of going to a standardized large container system for curbside pickup, (a Pilot Testing Program would be used) realizing considerable savings could be achieved through once-a-week pickup instead of the twice weekly system presently being used. Containers as large as eighty (80) gallons could - with a few exceptions - easily hold a week's supply of refuse. Referring to Table 2, the relative magnitude of such a change is quite high.

Feeling it essential not to leave the public with a feeling that the quality of refuse collection has deteriorated, it is recommended that:

-twice weekly pickups (with standardized containers) be continued until such time that a move to once weekly pickup would be more acceptable

-continue twice weekly pickups with the citizens using their present containers, until such time that a move to a once weekly pickup would be more acceptable, then, institute that move with the introduction of standardized containers.

While changing the method and frequency of collection will produce rather substantial savings in and of themselves, (Siler City also has curbside collection which is considered in the solid waste industry to have many advantages) further savings can be achieved by linking them to crew reductions. If one man, driving a right hand vehicle and picking up from the curb can do the job with the least cost to the community (see Table 1), why use more? Labor costs are a substantial amount of the overall budget; through resignations and/or transfers, these costs could be gradually reduced in conjunction with the introduction of system changes. Subsequently it is recommended that:

-efforts be made to reduce the crew size to a more manageable size as system changes are implemented

-all other things being equal, the task incentive system appears superior to the standard day system because of the low number of residences in Siler City. One of the necessary ingredients for success of a task incentive system, requires the determining of a fair day's work schedule (i.e., the number of residences that could reasonably be expected to be served on any particular day).

Regardless of the ultimate number of changes made, heuristic routing designed to minimize "back-tracking" of the refuse vehicles seems essential and is perhaps the least disruptive of any changes made in that the public is in no way directly affected by such a decision. All that is required of the city is a little experimentation to determine the best routes in a specified time.

(11) The Town of Siler City has the option of hiring a contractor to handle the commercial solid waste. A contractor would survey the town to determine the needs of the town and then apply that need to the different approaches which would be profitable to the contractor, but also reasonable to the manager. For example, one contractor that was contacted as a reference to this study indicated that his company could handle the residential and commercial collection in certain small towns, particularly towns under 10,000 population. The same contractor also indicated that he could possibly pickup the residential garbage in certain towns the size of Siler City utilizing the roll-out cost system (mobile toter) for a nominal fee. By utilizing a reputable contractor, a town can get out of the garbage business, which some small towns in North Carolina are doing profitably.

CONCLUSIONS

Based upon data reflected in this study which seeks to analyze Siler City's existing solid waste operation, and further evaluates local conditions and practices based upon contemporary methods being used in the solid waste industry, this study offers the following solutions and/or conclusive findings for the existing system.

The town should seriously consider mechanizing their existing commercial collection method. There are several approaches that could prove cost effective, which are:

The town should get away from the method of combined collection of commercial and residential garbage on a daily basis. Instead the town could possibly go to a mechanized (winch type) rear loading container with possibly a sharing system being utilized wherever feasible. This large mechanized rear loading container would allow for the cut-back of six-days-a-week of commercial pickups. Delay the purchase of a new truck for some time and use the budgeted capital to purchase the containers. The old garbage truck can be used as a back-up unit. If the town chooses to go to a rear loading container for commercial pickups of at least twice weekly (Wednesday and Saturday), then one three-man crew could easily pickup the residences in town on the current pickup days. On-route collection time would necessarily have to be increased. The task incentive approach could approach could be utilized if on-route collection time for residential collection started around 7:00 a.m. The residential pickup could be divided into quarters (as shown in Map 1) utilizing one truck with more stops per day.

Secondly, the town should consider contracting the collection services for the commercial solid waste. One or two approaches can be utilized (see

the alternatives for contract collection). This study recommends that the town purchase some front loading containers and lease or resell them to the merchants. Collection of the containers will be provided by a contractor who either bills the town directly or bills the merchants directly. Should the town move to contract collection of their commercial solid waste, hidden costs, unproductive on-route time and several other system problems can be solved.

Finally, this study recommends that the town consider purchasing a new rear-packer (20 cubic yard) truck, equipped with a winch device; and purchase the necessary rear loading containers, plus modify their existing system to accommodate the proposed changes effectively. It is suggested that the following consideration be taken into account if the town elects to purchase rear loading containers. The 2-3 yard containers are generally too small and not very economical; the 8 yard containers are too large; but the 4 and 6 yard containers are the optimum size and should handle most every commercial situation in town. The cost of rear loading containers will increase in price 12 percent annually or 1 percent monthly. The following price list is from one North Carolina dealer of waste equipment:

-80 gallon roll-out container - approximately $40.00 each assembled

-2 yard metal rear loading container - $252.00 each

-3 yard metal rear loading container - $312.00 each

-4 yard metal rear loading container - $387.00 each

-6 yard metal rear loading container - $518.00 each

-8 yard metal rear loading container - $617.00 each

Truck recommended:

Leach - 20 cubic yard rear packer, Model S-II

- Ford chassis, gas, automatic

-repair truck, chassis and body, not including FET

$32-35,000

Winch recommended:

8,000 lbs on S-II = cost approximately $1,400.00

If the Town of Siler City does decide to purchase a new truck, and the rear loading equipment to mechanize the current system, an important step in improving their municipal service would have begun. Town merchants and residents can appreciate and relate to the effective uses of their tax dollars.

APPENDIX

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